

THE MEDICAL JOURNAL OF AUSTRALIA

VOL. II.—43RD YEAR

SYDNEY, SATURDAY, NOVEMBER 24, 1956

No. 21

Table of Contents.

[The Whole of the Literary Matter in THE MEDICAL JOURNAL OF AUSTRALIA is Copyright.]

ORIGINAL ARTICLES—	Page.	ABSTRACTS FROM MEDICAL LITERATURE—	Page.
A Mental Health Programme, by E. Cunningham Dax ..	777	Radiology	806
Experiences with Staphylococcal Infections in a Maternity Hospital, by A. G. Mathew, M.R.C.O.G., and C. Manassis ..	781	Radiotherapy	807
Intermittent Claudication: I. Clinical Aspects, by A. J. Barnett and A. St. Clair ..	786	ON THE PERIPHERY—	
Intermittent Claudication: II. Natural History, by J. K. Francis and A. J. Barnett ..	794	"Queen Square"	808
REVIEWS—		OUT OF THE PAST ..	809
Handbook of Poisons	798	CORRESPONDENCE—	
The Surgery of Childhood for Nurses	798	Surgery and the Australian General Practitioners ..	809
A Short Practice of Surgery	798	Drugs and Import Restrictions	809
An Introduction to Electrocardiography	798	Poly-Vinyl-Pyrrolidone	809
Obstetrical Practice	798	Medical Attendance on Doctors and Their Families ..	810
Practical Section Cutting and Staining	799	Fate of Fluoride	810
Principles of Human Physiology	799	POST-GRADUATE WORK—	
The Royal Melbourne Hospital Medical Manual ..	799	The Melbourne Medical Post-Graduate Committee ..	810
Hydrocortisone in Orthopaedic Medicine	799	DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA ..	811
A Primer of Electrocardiography	800	ROYAL AUSTRALASIAN COLLEGE OF SURGEONS—	
Elements of Healthful Living	800	Open Meeting	812
The Office Assistant	800	NOTICE—	
BOOKS RECEIVED ..	800	English-Speaking Union Scholarship	812
LEADING ARTICLES—		CONGRESSES—	
Emil Kraepelin	801	International Congress for Social Medicine	812
Second World Conference on Medical Education ..	801	DEATHS ..	812
CURRENT COMMENT—		DIARY FOR THE MONTH ..	812
An Ophthalmic Survey	802	MEDICAL APPOINTMENTS: IMPORTANT NOTICE ..	812
Mortality Among the Married	802	EDITORIAL NOTICES ..	812
Crash Helmets	803		
Synthetic Detergents	804		
Naughtiness or Wheat Flour?	805		
Good Advice for Visitors to the United Kingdom ..	805		

A MENTAL HEALTH PROGRAMME.

By E. CUNNINGHAM DAX,

Chairman, Mental Hygiene Authority of Victoria, Melbourne.

My subject gives so wide a choice that it presents difficulties by its very lack of restriction and its freedom of approach. One might, for instance, pick a small and rapidly expanding suburban community, a country town with a well-established base hospital, or a city industrial area, and usefully consider the details of the services required on the basis of the psychiatric surveys which have been made in a number of such instances. On the other hand, the World Health Organization, the World Federation of Mental Health, the National Associations for Mental Health, the National Institute of Mental Health, the American Psychiatric Association and many other bodies have produced such a large amount of data from meetings, congresses and publications, that a composite review of the mental health services that have been advocated would be a major task, the results of which would be unlikely to be commensurate with the effort involved.

As a compromise I have tried to make a programme which gives a tabular summary of the services which might be made available for a population of about half a million (Table I). In a smaller community some of the services would need to be fused; thus one of the administrative units shown in the vertical column on the left side of the chart might cover the needs of several classes of disability, as shown in the top horizontal column. For instance, a single out-patient centre might cover the needs of children, adults and the aged. On the other hand, the administrative units shown in the left-hand vertical column could be amalgamated in the treatment of some type of disability so that, for example, domiciliary visiting, out-patients, a day hospital and the in-patient treatment of the neuroses could be managed together, say, from a general hospital unit. These types of fusion are fairly generally found at present, but subdivisions constantly have to be made under the pressure of numbers.

I should like to consider in turn each of the services listed in the left-hand vertical column, to provide a key to a chart which I fear must otherwise be obscure.

Prevention.

The need for research in all branches of psychiatry is obvious, but lamentably lacking in Australia compared on a population basis to the United States and Canada. Research in the social field is rarely popular, as the

¹ Read at a meeting of the Australasian Association of Psychiatrists on October 26, 1955, at Canberra.

solution to the problems raised by its findings are ultimately political, and it is uncommon for a government to invest in projects which are unlikely to produce immediate returns, or which involve it in unpleasant or unpopular decisions. Nevertheless, epidemiological studies with social reforms would do more to reduce the incidence of psychiatric disorder in the community than could be achieved by other known methods at the present time.

Preventive psychiatry is intimately concerned with the public education needed to teach people to live in an artificial environment. Training is urgently required for the many persons working in the social field, and their psychiatric understanding must be quite extensive. They must, for example, know the need for love and security in childhood, the value of the intact family and the effects of parental deprivation. They should learn to recognize the intellectually subnormal, the psychotic and the sociopath, and to be acquainted with the dangers of unemployment and loneliness in the elderly. It is important for them to know of the effects of alcohol, housing, migration and aging in the production of psychiatric disorders, and to be aware of the mental health facilities and social services that are available. Perhaps no one is so much in need of this knowledge as the general practitioners, whose psychiatric training has hitherto been woefully neglected in the medical curriculum.

Two other points would seem to need mentioning. The first is the ascertainment of the intellectually handicapped; this should apply to all persons ineducable in normal schools. Their training and supervision and the best advice to their relatives can thereby be arranged, and their whereabouts and numbers are then known for research and other purposes. The second point refers to the prevention of the psychoses, of which we know so little. The general practitioner is better aware of the medical history than others; he should be able to deal with or advise treatment in the earliest stages of illness, and to help counteract its onset in susceptible types of people.

Domiciliary Services.

In recent years the emphasis in the psychiatric services has tended to move from the mental hospitals to the early treatment units and the out-patient departments. As a further and logical development more attention has been paid to the prevention of illness, particularly by combating childhood disturbances and by the examination and treatment of patients in their homes.

The major part of domiciliary visiting in a health service will be undertaken by workers in the social field; whatever their qualifications should properly be, their training needs to be further determined and should probably differ according to their functions. In the medical field the visiting will be mostly done by general practitioners and consultants.

Much of the present work of the child guidance clinics would be obviated if the homes, schools and playgrounds could be visited, and if time were devoted to the parents, teachers and environment rather than to the child. In the case of the psychotic patient a psychiatric welfare officer should be able to be called in whenever a patient needs removal to hospital or breaks down on trial leave, or when his illness recurs or there are difficulties in his placement. The Duty Authorized Officers in England are of great assistance in carrying out these duties; there is something to be said for their being nurses.

Querido, in Amsterdam, has organized a scheme for visiting and treating psychotic patients in their own homes. Brooke, at Saint Helier Hospital in Surrey, developed a service for the visiting of the aged in a comparable way. In these schemes medical staff and social workers see in their own homes those patients who would ordinarily come into hospital, and this has developed into a preventive service. This practice obviously raises problems in any but a welfare State, though in England it has been overcome, in part, by the growing system of domiciliary visiting by part-time consultants engaged at the hospitals.

The existence of a strong probation officer service is essential for the domiciliary care and treatment of alcoholics, drug addicts, sex deviants and some people with

psychopathic personalities. Many of them are referred to the psychiatrist from the courts, and the probation officer therefore acts in these cases both as the social worker and as an intermediary between the court and the psychiatrist.

Out-Patient Departments.

The function of out-patient departments is so well known that little need be said about them. It is usual for the intellectually handicapped to be examined at children's clinics, though at Travancore in Melbourne a special clinic for the examination of the intellectually handicapped has been a success. The psychotics and neurotics normally attend the same out-patient department, but to have a separate clinic for intensive psychotherapy is an advantage. The sociopathic clinic, run in conjunction with the courts and associated with an adequate probation officer service, might be worth developing. It would have its difficulties and disappointments, but would be of much assistance to the courts and be useful to patients in the early stages of addiction and to others for whom specific treatment would be likely to be of value.

Day Centre.

The day hospital for adults is still in its experimental stages, and there are some doubts whether the economic and bed-saving values are as great as was originally hoped. Special schools and play therapy for disturbed children have long been accepted. The day centre movement for intellectually handicapped children is rapidly gaining favour, and those with a medium level of backwardness are particularly suitable cases; often, as a result of attending these centres, they can remain at home instead of having to go to hospital.

Early In-Patient Treatment.

Early treatment is usually necessary on the one hand for a crisis involving, for instance, a soiling child or a suicidal gesture, or on the other for a condition which is likely to progress unless dealt with. The general hospitals for children or adults often receive the patients with childhood disturbances, the neurotics and the patients with psychosomatic disorders. They are fairly satisfactorily treated in psychiatric departments in these hospitals; whereas the intellectually handicapped are better transferred to a developmental centre, if such exists, and the psychotics moved to a reception hospital or early treatment centre. The question arises whether a ward for the more disturbed geriatric patients should be in a general hospital, in a special geriatric hospital, or in the psychiatric reception hospital. This is usually determined by the local services which are available.

The supervision of the patient remanded by the courts for medical examination, the care of the acute alcoholic, and the placement of the drug addict, have often been regarded as the functions of the prison hospital. The prison hospital is rarely comparable to other units in its facilities for examination, it may not be a part of a psychiatric service, and it does not provide accommodation for which the voluntary patient would usually apply.

Rehabilitation.

The term rehabilitation is used here to imply that the person is likely to make a social adjustment with prolonged assistance.

In the training centres for the higher grades of the intellectually handicapped, a decision as to the patients' potentialities can often be made in their early teens, and their training can be directed to this end. The centre may well be run on community lines, and this gives the chance for the patients to be employed in a way which will give them instruction and at the same time help the others.

In the case of the mental hospitals I would split off the intellectually handicapped and the aged, and separate those in early treatment units from the rest. The patients remaining will still form a large proportion of the numbers and can be divided into two groups: first, those who can usefully be employed with supervision or instruction and who are potentially capable of rehabilitation; secondly,

TABLE I.

Administrative Units.	Childhood Disturbances.	Intellectually Handicapped.	Neurotics.	Psychotics.	Geriatric.	Sociopathic.
Prevention ..	Research. Family. Parents.	Research. Ascertainment.	Research. Social field. Information bureau.	Research. Social field. Medical history.	Research. Social field. Visits. Employment.	Research. Social field. Migration.
Domiciliary ..	Social workers.	Inspectors.	Social workers.	Amsterdam scheme. Psychiatric welfare officers.	Saint Heller scheme.	Probation officers.
Out-patients ..	✓	✓	✓	✓	✓	✓
Day centre ..	Play.	Training.	Day hospital.	Day hospital.	Day hospital.	? Prison.
Early in-patient treatment.	Children's hospital.	Developmental centre.	General. Neurosis centre.	Reception hospital.	Geriatric reception hospital.	Receiving ward.
Rehabilitation ..	Children's psychiatric unit.	Intellectually handicapped training centre.	Social service residential unit.	Industrial hospital.	Geriatric mental hospital. Long stay annexe.	Herstedvester.
Occupation ..	Child psychiatric unit.	Colony.	Mental hospital.	Mental hospital.	Geriatric mental hospital.	Prison or long-term unit.
Hostels ..	Foster parents. Emergency hostel.	Working patients' hostel. Farm hostel.	✓	✓	Benevolent. Old people's homes.	Voluntary.
Social club ..	Voluntary teenagers' clubs. Police boys' clubs.	Ex-trainees' social club.	Out-patients' social club.	Ex-patients' social club.	Darby and Joan club.	Alcoholics Anonymous.
After-care club: Social workers. Out-patients. Return hospital.	✓	✓	✓	✓	✓	✓

those who may be called "the occupational patients", who should be separately treated, since their need is one of group care with a view to promotion to the rehabilitation class.

The long-stay annexe for the elderly has been recommended by the Ministry of Health in England as a unit run from the general hospital, but having some of both the physicians and nurses with a psychiatric training. After mental hospital treatment they often need accommodation in a benevolent or old people's home rather than be returned to employment, though up to 40% of those aged sixty-five years and over are discharged within a year of admission. Most frequently those leaving the reception hospital go to their homes, and others who are rehabilitated from the long-stay annexes or geriatric mental hospital units go to the institutions.

In our consideration of rehabilitation of the psychopathic personalities, Stirrup's work at Herstedvester should be mentioned. The secret of his success seems to be his power of indeterminate detention; this I believe is the only means of treating any of the sociopaths; in particular, a definite period of detention for the alcoholic or drug addict is of little use.

Occupation.

The occupational units, used in this sense, are those units from which the patients are unlikely to recover though they may graduate to the rehabilitation unit. The aim of the occupational unit is to occupy its inhabitants usefully, particularly through group activities and routine organization.

Regressed children, I think, do better by associating with the intellectually handicapped than they do in an adult unit, particularly if it should be a mental hospital.

Some chronic neurotics can be nursed only in a mental hospital, though Maxwell-Jones at the Belmont unit has shown that many of those who are apparently unemployable can be helped by social therapy.

There are many social misfits in the overlapping fringe between psychiatry and criminology who might be usefully occupied and live a fairly full life though unlikely to make a social recovery. The design of the most suitable unit for their detention under the appropriate legislation has yet to be settled.

Hostels.

Children are better off in a family than in an institution, but temporary emergency accommodation is useful, and Hilda Lewis's new book gives an interesting and important description of the type of children and the circumstances under which they need this care.

A hostel is useful for the recovered psychotics and neurotics who cannot manage to remain well except by living in a protected community. Such an organization as the Mental After Care Association can keep a number of patients at work who would otherwise be in hospital.

Most of the hostels for alcoholics, discharged prisoners and others who have become social "problems" have been founded by voluntary bodies and usually religious organizations.

Social Clubs.

Psychiatric social clubs are proving a great success and are expanding. They have a value in the prevention of illness or relapse; they are an excellent means of observing a large number of patients in a small time for follow-up purposes. They also provide a social life for people who would otherwise be without friends and whose social isolation has contributed to their disability. They can be multiplied as they succeed; so clubs may be formed to deal with the young, the old, the ex-patients and out-patients, those on trial leave and those who need group support.

After-Care.

The social club is perhaps the easiest method of after-care. It is unfortunate that the lack of social workers often limits the follow-up of many patients who might be saved a relapse by more attention, although one must consider whether the staff needed and the energies expended would be warranted by the results if following up were organized on a general scale. Mostly the psychiatrist can make a fair estimate of those who will need attention, and arrange to see them at the out-patient departments or give the necessary warning to the relatives.

The Provision of the Mental Health Programme.

The need to evolve a complete mental health service is desirable on the grounds of the incidence of psychiatric disorder, the cost of mental ill health to the community, and the saving which results by early treatment. The

Stoller report gave some indications of the expense of psychiatric illness to the community; but if an estimate could be made which would also cover the effect of neurotic disorder in industry and the home, it is probably not an exaggeration to say that mental ill health would be found to have a significant effect on the national economy.

The first need in the formation of a mental health service is the demonstration of its necessity, since the financial outlay in its formation is considerable and a large number of people must be specially trained to take a part in its functions. This demonstration is not easy, as there is not much other than a mass of figures and scientific papers which can be shown to prove the need, or in fact to show the results which can be obtained by spending money on the programme.

The mental hospital is obvious and tangible, though usually to be avoided; but the economic loss due to the lack of therapy for the neurotic patients or the effects of an out-patient social club are more difficult to show, and it is harder to obtain funds for these purposes.

If we assume that the need for a complete mental health programme is accepted, that the urgency of its formation is realized and that the finances are forthcoming as a long-term investment, it still has to be asked how the programme can be carried out. To this end I want to come to a more definite discussion—namely, the possible function of the Commonwealth Government in the mental health programme.

The mental health services in Australia, I think we shall all agree, are too poorly equipped and inadequately supported to fulfil their proper function. Moreover, there is no Federal mental health service of any kind to give advice to the parliamentary representatives, or to decide in what way it can best help in preserving the mental health of the community.

On the basis of what is done elsewhere I would like to suggest that the Commonwealth might give help in four ways—teaching, prevention, research, and stimulation—and I will deal with these in turn.

Teaching.

In a scattered country community, where general practitioners have a very great deal of responsibility, they should have the same training to deal with their psychiatric emergencies as they have for those in other branches of medicine. One wonders what sort of a revision of the medical curriculum would occur if the teaching were based on a proportional representation of the incidence of disorders met with in practice, and if much of the medical student's practical experience was gained within the community instead of the hospital. It will be interesting to see what comes out of the Cleveland experiment on medical training.

It would obviously be wrong for anyone other than the universities themselves to decide upon what is a proper system of training. But if the funds for professors or other psychiatric teaching personnel were provided by the Commonwealth, they might be gladly accepted and have a definite effect upon psychiatric training in the medical schools.

However, the teaching of psychiatry is no academic study within a closed department; it must take place in the community in conjunction with the public health services and be largely concerned with the field of preventive medicine. The teaching of the many workers in the social field must also be regarded as an essential part of psychiatric instruction. The necessary training must be supplied to such workers as the infant welfare sisters, public health nurses, kindergarteners, teachers, clergy, those in charge of hostels and homes (particularly for children), social workers, police, probation officers, club leaders, nurses, and many more such people concerned in the care of education of people in the community.

Prevention.

It is only through the aid of these workers in the social field that information can be supplied to the public, that

community mental health education and healthy attitudes can be spread, and that preventive psychiatry can be diffused throughout the country. It is interesting that an official Department of Public Instruction has been founded in Switzerland, and that the National Institute of Mental Health in the United States of America and the Federal body in Canada have undertaken the development of community mental health services, their coordination and the public education.

It is not realized as fully as might be how many of the admissions to psychiatric hospitals are associated with causes which are capable of being controlled, or at least influenced in the social field. I refer particularly to the admissions associated with, for instance, alcohol, old age, and migration.

In Victoria, alcohol plays a major part in the causation of about 20% of all admissions, and in a recent month 40% of the male admissions to Royal Park Receiving Hospital were at least in part due to this factor.

The occurrence of mental disorder in those aged sixty-five years and over is more than two and a half times the incidence of this age group in the general population, and much greater in those living alone than in the married or in those living in a family.

The International Refugee Organization migrants, as might be expected, considerably increased the admission of New Australians to the psychiatric hospitals, though in many cases the psychoses were acute and recoverable. The numbers have diminished in the past two years, but there are still some migrants who come into hospital and are found to have a history of previous breakdowns or even evidence of chronic illness. The question of intelligence levels is also one needing examination.

These matters are in part concerned with legislation, but they also raise problems which can be solved only by research in the social field and the taking of action on the findings, which could most adequately be done by a Commonwealth organization.

Research.

Plans for productive social research are of importance in the Australian community; among the many pressing inquiries needed are the effects of overcrowding on broken homes and parental deprivation; the incidence of delinquency and "suburban neuroses" in rapidly spreading populations; and the personal factors in road accidents. It seems that many such researches might be undertaken by a department, as suggested above, sponsored by the Federal Government, perhaps in the National University through a research professorship.

Similarly, there are many other interesting and important inquiries which could also be undertaken from a Commonwealth centre, not only in experimental research, but also, for example, into the aetiological factors of mental defect or the distribution of cases of Huntington's chorea, which Brothers has followed with so much effect in Tasmania and Victoria.

There are many epidemiological studies needing to be done in regard to specific disorders, their occurrence and their form in a young and expanding population. Australia is particularly well suited to these researches, especially at the present time. The population is not too large for such inquiries to be made, and the community is relatively closed. Thus, whereas in Europe a difficult patient was sent on a long sea voyage, in Australia he only goes "interstate".

Stimulation.

The Federal Government can stimulate this teaching, prevention and research throughout the Commonwealth, and also do much towards the general encouragement of community treatment and care.

The mechanism already exists for States to receive hospital benefits when patients are treated in hospitals for the potentially recoverable. This should stimulate the building or setting aside of more of these early treatment units, which should, subject to their own special needs, be completely comparable to the acute general hospitals.

More recently the Commonwealth has granted £10,000,000 between the various States, in consequence of the findings of the Stoller report. This grant is particularly to be used for the provision of new beds, and to stimulate early treatment.

These and the other methods of stimulating education, prevention, research and early treatment are most useful ways of improving the psychiatric services. They will also give the opportunity for a mental health programme to be organized which will provide for the growing needs of a young, active and expanding population. But this is not all, for unless the financial advantages to be gained can clearly be demonstrated to a government they can do little. Moreover, unless there is enough public opinion strongly in favour of a complete mental health programme, no move can be expected. Surely the first need is that we ourselves should have common aims and ideals and together agree on the best means of meeting the requirements of our community.

EXPERIENCES WITH STAPHYLOCOCCAL INFECTIONS IN A MATERNITY HOSPITAL.

By A. G. MATHEW, M.R.C.O.G., AND C. MANESSIS,
King Edward Memorial Hospital for Women, Perth.

AN increase in the frequency of outbreaks of staphylococcal infections in maternity hospitals has been observed since the introduction of antibiotics and the subsequent appearance of resistant organisms. Capon (1955), however, considers that overcrowding in maternity units, leading to hurried and careless handling of patients, is the most important factor in the production of these outbreaks.

This paper deals with the bacteriological and clinical aspects of a well-established epidemic of staphylococcal infections in a maternity hospital, with the steps taken to overcome it, and with the ultimate reduction of the incidence of infection.

CONDITIONS OBSERVED AT COMMENCEMENT OF INVESTIGATION.

For several months up to the commencement of this investigation in October, 1953, there had been an alarming increase in the number of staphylococcal infections among the newborn babies. In addition to minor pustules, umbilical infections and paronychia, numerous babies with *pemphigus neonatorum* and others with extensive areas of cellulitis and large subcutaneous abscesses were seen. Eye infections of all degrees of severity were frequently encountered. However, in this hospital the more serious sequelae were not observed.

The mothers were also affected, but to a much lesser extent. Breast abscesses were the most serious conditions encountered, whilst occasional staphylococcal genital tract infections and minor furuncles and other skin infections were seen.

In addition a number of persistent staphylococcal skin infections was observed amongst the nursing staff.

The hospital itself was grossly overcrowded. There were 139 post-natal beds in wards originally erected for 88, and the nurseries were correspondingly crowded.

Various other factors, such as inadequate hand-washing facilities, unsatisfactory sterilization of bedpans and haphazard asepsis in the nurseries, were apparent. The laundry appeared to be a likely source for maintaining and propagating cross-infection.

Steps were taken to overcome these and other defects, and a campaign of bacteriological investigation was initiated.

BACTERIOLOGICAL INVESTIGATIONS.

Almost invariably the infections were due to *Staphylococcus aureus hemolyticus*, coagulase-positive (*Staph. pyogenes*).

Investigation of Staff as Possible Sources of Infection.

Nasal Carrier Rate of Nursing Staff.

From February to December, 1953, of 713 nasal swabs investigated, *Staphylococcus pyogenes* was found in 230 (32.2%).

Antibiotic sensitivities (by the "dry disc" method) were tested only in the last two months of this investigation, when all the 23 staphylococci from the nasal cultures were found to be resistant to a disc strength of 1.0 international unit of penicillin.

The proportion of staphylococci in nasal cultures in the summer months is significantly higher ($P < 0.001$) than in the winter months. [In February, March and December there were 74 cases out of 129 (57%) and in June, July, August and September, 72 cases out of 302 (21%).]

On the whole, the proportion of staphylococci amongst the nursing staff is significantly lower ($P < 0.001$) in comparison with the findings of Hobbs (1947) and of Barber *et alii* (1953) [with 72 cases out of 103 (70%) and 35 cases out of 52 (67%) respectively].

In June, 1955, during an investigation of an outbreak of staphylococcal infections in the premature nursery, cultures were prepared from nose and throat swabs of 15 members of the nursing staff. Five of the nurses were found to be nasal carriers of *Staph. pyogenes*. Phage typing was carried out by Dr. Phyllis Rountree, and two of these organisms were found to be the epidemic type 80 (which was also found in three cultures from infected babies). These two members of the staff were excluded from the nursery, and treated with nasal applications of "Neotracin" ointment.

In view of the incidence of type 80 carriers in this group, a further survey of the whole nursing staff was carried out. Of 106 nasal swabs taken, *Staph. pyogenes* was found in 38 (35.8%). All were penicillin-resistant. This shows little variation from the 1953 figures. Dr. Rountree phage-typed this group, and found no further type 80 carriers, but one type 81.

Minor Infections Amongst the Staff.

From November, 1953, to March, 1955, 22 pyogenic infections amongst the nursing staff were investigated, and 19 of these were due to penicillin-resistant staphylococci.

Four of five pyogenic infections in members of the laundry staff were also due to penicillin-resistant staphylococci.

Maternal Infections.

Genital Tract Infections.

Of 854 cervical and vaginal swabs examined, *Staph. pyogenes* was found in 80 cases (9.36%), and the organisms were resistant to penicillin in 65 of these (81.3%). In the last five months of the series, during which time 187 swabs were examined, only one pyogenic staphylococcus was grown on culture, and this was a penicillin-sensitive organism. These findings are set out in Table I.

This decrease in the proportion of infections due to *Staph. pyogenes* is highly significant ($P < 0.001$), and indicates a satisfactory check to the epidemic as a whole, particularly as this period was during the summer, when conditions are most favourable for staphylococcal infections.

Breast Infections.

The findings relating to breast infections are set out in Table II.

Breast Abscesses.—Of 20 breast abscesses incised, 19 were found to be due to penicillin-resistant *Staph. pyogenes*. An interesting observation on the course of the epidemic is that 17 of these abscesses occurred in the first four months of the series.

Cultures of Breast Milk.—One hundred and ninety-one specimens of breast milk were investigated bacteriologically, and *Staph. pyogenes* was found in 103 (54%). Of these 103 strains, 91 (88%) were penicillin-resistant.

These specimens were examined during the investigation of puerperal pyrexias of unknown origin, or in cases in which breast infection was actually suspected.

Special Investigation.—During the course of this epidemic, it was noticed that moderate elevations of temperature during the first three to five days of the puerperium were often attributed to engorgement of the breasts, yet other patients who developed more pronounced engorgement had normal temperatures.

Cultures were attempted from breast milk specimens, taken with strict aseptic precautions, in 71 cases. (Centrifuged deposits of milk were cultivated onto blood agar plates, and smears of these deposits were also examined microscopically for the presence of leucocytes and organisms.) The results were as follows:

In the control series there were 25 patients—that is, patients with no elevation of temperature or breast engorgement. Penicillin-resistant *Staph. pyogenes* was grown on culture in four of these (that is, one-sixth).

There were four groups of breast conditions, as follows: (a) Patients with engorged breasts, but no elevation of temperature. *Staph. pyogenes* was grown on culture in six out of 12 of these cases (one-half). (b) Patients with engorged breasts with a rise in temperature. *Staph. pyogenes* was cultured in 20 out of 26 of these cases (three-quarters). Three of these mothers also had cracked nipples. (c) Patients with "flushed breasts" (engorgement with mild, diffuse reddening). *Staph. pyogenes* was grown on culture in six out of seven. One patient had a normal temperature, but temperatures were elevated in the other six cases. One patient also had a cracked nipple. (d) Patients with cracked nipples. *Staph. pyogenes* was grown on culture in four out of five of these cases. Four of these patients have already been mentioned, and the fifth had no other abnormality.

TABLE I.
Mothers: Genital Tract Infections.

Period of Survey.	Number of Cases.	Staphylococcus pyogenes Grown on Culture.		
		Penicillin-Sensitive.	Penicillin-Resistant. ¹	Total.
First half ..	504	14	53	67
Second half ..	350	1	12	13
Total ..	854	15	65	80

¹Percentage of total genital tract infections due to penicillin-resistant staphylococci, 7.7.

The association between these four groups of breast conditions, and the proportion in each due to *Staph. pyogenes*, were investigated and found to be statistically highly significant ($P < 0.001$).

All these were patients who clinically would not have been designated as having infected breasts, and in general were treated by expression of milk and possibly administration of oestrogens, but no antibiotics were given. In the above-mentioned four groups of breast conditions, 32 samples of milk from 45 engorged breasts contained *Staph. pyogenes*; this indicates that many congested breasts are already infected, or potentially infected, before the congestion is relieved.

Relationship of Neonatal and Maternal Infections.—Cunliffe (1949), Wallace and Duguid (1952) and Ludlam (1953) have observed that a high percentage of newborn babies rapidly become nasal carriers of penicillin-resistant *Staph. pyogenes*, acquiring these from the air in nurseries. Wallace and Duguid (1952) suggest that the infants may then acquire their infections from this source. Ludlam (1953) indicates that the babies are the sources of penicillin-resistant staphylococci causing infections in the

mothers. With this in mind, the time relationships of infant and maternal infections with penicillin-resistant staphylococci were studied in 37 cases, and in 20 of these the neonatal infection preceded the maternal infection. With breast infections, in seven out of 11 cases, the infant had a staphylococcal infection before the mother developed one.

This suggests that in some cases of breast infection the milk becomes contaminated with staphylococci acquired from the infant. In other cases the organism may be acquired from the mother's own skin. When the breasts become congested, the organisms proliferate in the stagnant milk, and if this congestion persists, a mild infection may develop and the mother's temperature will rise. However, if, as is generally the case, the congestion is relieved at this stage, the contaminated milk is discharged, and local defence mechanisms prevent the infection from spreading beyond the alveoli, and speedily overcome it. When the breast becomes "flushed", the infection has spread beyond

TABLE II.
Mothers: Breast Abscesses.

Period of Survey.	Number of Cases.	Staphylococcus pyogenes Grown on Culture.		
		Penicillin-Sensitive.	Penicillin-Resistant.	Total.
First half ..	18	—	17	17
Second half ..	2	—	2	2
Total ..	20	—	19	19

the alveoli into the supporting tissues; but once again it may spontaneously subside. However, if the congestion is not relieved in one or more lobules, the organisms proliferate in this most suitable culture medium of stagnant milk, and spread to produce cellulitis, ultimately progressing to abscess formation.

In our opinion cracked nipples simplify the entry of pathogenic organisms, the incidence of contaminated milk is high, and it is likely that infection will supervene in many cases.

These theories do not agree fully with those of Waller (1939) and of Nalsh (1947), who, however, do not consider bacterial contamination significant in relation to early engorgement with pyrexia, and flushed breasts.

Neonatal Infections.

Eye Infection.

The data relating to neonatal eye infections are set out in Table III.

Of 434 eye swabs culturally examined, 261 (60%) yielded *Staph. pyogenes*, and in 223 of these 261 strains (85%) the organisms were penicillin-resistant. Of the 261 infections due to *Staph. pyogenes*, 166 occurred in the first half of the series and 95 in the second half. This difference is highly significant ($P < 0.001$), and indicates that the number of eye infections due to *Staph. pyogenes* has decreased in the second half of the series.

In the early months of 1954 the prevalence of eye infections in one particular nursery spurred us on to carry out further investigations. At this time the babies' eyes were wiped at birth and in the nurseries with swabs wrung out in saline, which was prepared in the labour ward. When a discharge developed, sulphacetamide eye drops were instilled into many of the babies' eyes.

Cultures were made of the various preparations used for eye toilets in the nurseries. Swabs from "sterile" containers yielded growths of *Bacterium coli*, *Bacillus mesentericus* and *Staph. pyogenes*. The saline yielded similar organisms, and from the sulphacetamide solution *Staph. pyogenes*, *B. mesentericus* and *Monilia albicans* were grown

on culture. The last-mentioned contaminant was traced to the original preparation of the sulphacetamide solution. Professor Ida Mann considered that these eye drops were useful only because of their mechanical cleansing effect on the eye, and their use was discontinued. Most of the contamination took place in the nurseries—for example, swabs were being removed from the containers by hand.

Cultures were also prepared from swabs taken from the eyelids of 11 normal babies aged from one to ten days, and in eight of them penicillin-resistant *Staph. pyogenes* was grown. Haemolytic streptococci were grown on culture from another two of these. Edmunds *et alii* (1955) found a *Staph. pyogenes* carriage rate of 35.3% in swabs from babies' eyes on the fourth day. It appears, therefore, that many babies' eyes are potentially infected with these ubiquitous organisms, and these results indicate the danger of unnecessary interference with and handling of the babies' eyes.

TABLE III.
Babies: Eye Infections.

Period of Survey.	Number of Cases.	Staphylococcus pyogenes Grown on Culture.		
		Penicillin-Sensitive.	Penicillin-Resistant. ¹	Total.
First half ..	277	32	134	166
Second half ..	157	6	89	95
Total ..	434	38	223	261

¹ Percentage of total eye infections due to penicillin-resistant staphylococci, 51.4.

Skin Infections.

The data relating to skin infections are set out in Table IV.

TABLE IV.
Babies: Skin Infections.

Period of Survey.	Number of Cases.	Staphylococcus pyogenes Grown on Culture.		
		Penicillin-Sensitive.	Penicillin-Resistant. ¹	Total.
First half ..	95	6	78	84
Second half ..	44	1	38	39
Total ..	139	7	116	123

¹ Percentage of total skin infections due to penicillin-resistant staphylococci, 83.5.

Of 139 neonatal skin infections from which cultures were prepared, 123 (88.5%) yielded *Staph. pyogenes*, and in 116 of these 123 strains (94.3%) the organisms were penicillin-resistant.

Of the 123 neonatal skin infections due to *Staph. pyogenes*, 84 occurred in the first half of the series and 39 in the second half. This indicates a significant ($P < 0.001$) and satisfactory decrease of these infections in the second half of the series.

As well as a decrease in the number of infections, there has been a pronounced decline in the incidence of severe pyogenic infections. A number of babies developed cellulitis and abscesses, or severe generalized pemphigus, in the earlier months of the series; but in the last nine months these types of lesions did not occur.

Enteritis.

The findings relating to enteritis are set out in Table V. There were 21 cases of enteritis, and two of these were due to penicillin-resistant *Staph. pyogenes*. The absence of

any case of enteritis in the second summer of the series illustrates a pronounced improvement in nursery asepsis and in the prevention of cross-infection.

Infection amongst Premature Babies.

Since March, 1955, there have been two small outbreaks of infection in the premature nursery. These were mainly eye infections, but there were a few cases of skin sepsis. On the first occasion, *Staph. pyogenes*, *B. mesentericus* and *Bact. coli* were grown in cultures from swabs used for eye toilets and for oiling the babies. Once again it was found that the swabs were being contaminated by removal by hand from the containers, and also, after having been autoclaved, they were stored for some time in linen bags on dusty shelves. In the second outbreak, pyogenic staphylococci were grown in cultures from the hands of the nurses oiling the babies soon after their arrival in the nursery, from the olive oil, and from the sink and bench on which the babies were oiled. *Staph. albus*, and occasionally *Bact. coli*, were obtained from the skin of newborn babies on their arrival in the premature nursery. After the babies had been oiled, however, *Staph. pyogenes* and enterococci were also grown in cultures from their skins.

TABLE V.
Enteritis in Babies.

Period of Survey.	Number of Cases.	Staphylococcus pyogenes Grown on Culture.		
		Penicillin-Sensitive.	Penicillin-Resistant.	Total.
First half ..	18	—	2	2
Second half ..	3	—	—	—
Total ..	21	—	2	2

It is obvious that oiling the skin of newborn babies under these circumstances only increases the danger of staphylococcal infection, and steps have now been taken to abolish this procedure. The potentialities of the communal bench and sink for causing staphylococcal contamination of the newborn are also obvious here, particularly as it was the only place where nurses could wash their hands.

In view of this evidence of contamination occurring from the nurses' hands, a survey of the nasal flora of the 15 members of the nursing staff working in the premature unit was carried out, as has been mentioned earlier. Exclusion of the two type 80 carriers from the nursery, and improvement in hand-washing techniques, resulted in an immediate cessation of infections.

Overall Incidence of Staphylococcal Infection.

There were 4899 deliveries at the King Edward Memorial Hospital for Women in the period under review (November, 1953, to March, 1955, inclusive). Ninety-nine of the mothers (2%) and 384 of the babies (7.8%) developed infections due to *Staph. pyogenes*. Infections due to penicillin-resistant organisms occurred in 1.7% of the mothers and 7.1% of the babies. There was no mortality due to staphylococcal infection.

Sequela.

In 34 cases of staphylococcal pneumonia in infants aged under six months, which occurred at the Princess Margaret Hospital for Children and were reported by Wallman *et alii* (1955), one baby had been delivered at King Edward Memorial Hospital for Women.

This baby developed numerous small superficial blebs due to a penicillin-resistant *Staph. pyogenes*, and was treated by the local application of *Lotto Hydrargyri Perchloridi*. When she was discharged from hospital, her skin was quite clear. She was subsequently admitted to the Princess Margaret Hospital with staphylococcal pneumonia, where she recovered.

This case is mentioned to illustrate one of the late dangers of staphylococcal infections in the newborn.

CLINICAL ASPECTS.

As the majority of the staphylococci were penicillin-resistant, various other antibiotics were tried, and "Terramycin" was found to be the most universally suitable, with regard to both absence of side effects, and rapidity and effectiveness in overcoming these infections. Furthermore, although there have been reports of increasing resistance to "Terramycin", this has not been our experience, despite constant use of this agent for over two years. During the period from November, 1953, to December, 1954, inclusive, 86 of 614 (14%) strains of a staphylococci were resistant to "Terramycin" (a disc strength of 25 microgrammes of "Terramycin" being used), whilst in the period from January, 1955, to January, 1956, inclusive, only 13 out of 324 (4.0%) strains of staphylococci were resistant to "Terramycin". This reduction in the proportion of "Terramycin"-resistant strains in the last thirteen months is highly significant [$\chi^2 = 21.39$ on one degree of freedom ($P < 0.001$)] compared with the first fourteen months.

TABLE VI.

Group.	Number of Cases.	<i>Staphylococcus pyogenes</i> Grown on Culture.
Controls	25	4
A. Engorged breasts, temperature not elevated	12	6
B. Engorged breasts, temperature elevated	26	20
C. "Flushed breasts"	7 (cracked nipples in 3)	6
D. Cracked nipples	5 (cracked nipples in 1)	4
	(including 4 in groups B and C)	(including 4 in groups B and C)

In only three cases has it been necessary to use erythromycin, which has been held in reserve. It was hoped that if the use of penicillin was almost excluded, the number of staphylococci resistant to this antibiotic might gradually decrease; but so far this has not been our experience. Of all the infections due to *Staph. pyogenes* in the first eight and a half months of the survey, 284 out of 336 (84.5%) strains of *Staph. pyogenes* were penicillin-resistant. In the second eight and a half months, 141 out of 149 (94.6%) were penicillin-resistant. This indicates a significant [$\chi^2 = 8.817$ ($P < 0.01$)] increase in the proportion of staphylococci resistant to penicillin. Lowbury (1955) maintains that the only way of preventing cross-infection with resistant, as distinct from sensitive, organisms is to stop using the antibiotic in question. We have observed in agreement with Isbister *et alii* (1954) that several of the less acute lesions treated locally, and without antibiotics, showed a pronounced tendency to persist and recur, after the patient's discharge from hospital.

Mild tear-duct infections in the newborn—the so-called "sticky" eyes—were treated by half-hourly irrigation with sterile normal saline (as recommended by Professor Ida Mann) and gentle massage of the tear-ducts. In addition to this, local applications of a suitable antibacterial cream to the eyelids every two hours, and the giving of an antibiotic by mouth in some instances, were required for the more severe cases of conjunctivitis and blepharitis.

Apart from "Neotracin" cream, local applications of antibiotics were avoided in the skin infections. After incision of pustules, tincture of "Zephiran" or *Lotto Hydrargyri Perchloridi* was most frequently applied locally, other agents such as gentian violet having been found less effective. Antibiotics were withheld in all but the more severe and persistent infections, when "Terramycin" was administered orally in most cases. This is in agreement with the work of Capon (1955) and Lowbury (1955).

Steps Taken to Improve Results.

Nasal Carriers.

As we have seen, one-third of the nursing staff were carriers of *Staph. pyogenes*. There appeared to be no practicable method of excluding these, and local applications of an antibiotic cream were not altogether satisfactory. The only methods of overcoming this source of infection were satisfactory masking techniques and prevention of cross-infection from hand contamination.

More recently, as recommended by Hardymont (1954), Campbell (1954), Collins (1954) and Rubbo (1955), who consider that there is little risk of air-borne infection from a nasal carrier, compared with the danger of hand-borne contamination from the frequent handling of masks, the wearing of masks has been abolished in the nurseries. It is too early to assess results, but there has certainly been no increase in neonatal infections.

Hand Transfer of Infection.

Hand-washing facilities were improved by the installation of wash basins in all nurseries. Community hand towels were replaced by individual disposable towels, which were autoclaved before use. Suitable receptacles were provided for discarded towels and masks. Hexachlorophene soap was supplied for hand washing and for bathing the babies. Although bacteriological investigation showed that hand washing for three minutes with this soap did produce surgical cleanliness, pressure of work frequently made it impossible to wash for this length of time.

By the institution of these methods, members of the nursing staff have become more aware of the dangers of transferring infection by hand, and these dangers have thus been reduced.

Air-Borne Spread.

Air cultures were attempted in wards and nurseries at various times. The air sampling was carried out with a "Casella" slit sampler, air being drawn in at the rate of one cubic foot per minute for two minutes onto blood agar plates. Only *Staph. albus* and *B. mesentericus* were grown, and no pyogenic staphylococci were found. In one ward the average number of bacteria-carrying particles per cubic foot of air was 33, but after fumigation, this number dropped to 10. The concentration was highest at the entrance to the ward. The average number of bacteria-carrying particles per cubic foot of air in the four nurseries was 19.

Wallace and Duguid (1952) considered air-borne spread an important method of cross-infection. Air-conditioning appeared to be the only method of overcoming this danger in our overcrowded nurseries (particularly as the use of large fans has been the only means of cooling during long, hot summers) and plans for such installations are now under way.

The nursery floors were composition-covered, and vacuum-cleaning was continued as recommended in the Medical Research Council Memorandum Number 11 (1951).

Isolation.

Every baby, when either potentially infected or showing early signs of infection, was transferred to an isolation nursery, nursed by a separate staff, and not returned to the main nurseries. The situation was more difficult in one ward block and the premature nursery, both of which lacked isolation units, and it was only possible to barrier-nurse infected babies in the main nursery, or in adjoining corridors. Despite these difficulties, satisfactory results were obtained. Bacteriological investigations were carried out whenever it was possible.

Babies with severe infections, and mothers with pyogenic cutaneous lesions or breast infections, were transferred to a twelve-bed isolation unit, where "rooming-in" could be instituted.

Laundry.

Investigation of clean linen—namely, hand towels, sheets and napkins—from the laundry revealed contamination with *Staph. pyogenes*. In sampling the linen, similar

results were obtained (with the use of blood agar plates) by both the "press-plate" method and also by passing the extension slit of the slit sampler over the linen.

Church and Loosli (1953) pointed out that clean linen frequently became recontaminated during the drying and extracting processes in laundries. They recommended that soiled and clean linen should be handled in two separate, self-contained units, and by different staffs. This was not practicable in our own unit; but as it was possible that clean linen could be recontaminated not only by air-borne spread from the sorting of soiled linen, but also by members of the laundry staff with staphylococcal infections, it was decided to autoclave all linen, napkins and clothing used for babies, and all hand towels used by staff and patients, after laundering. Hardymont (1952) recommended the autoclaving of all linen and clothing used in nurseries.

We conducted experiments as to the most suitable sizes of laundry bundles to be autoclaved. Swabs inoculated with twenty-four hour broth cultures of *Staph. pyogenes* were placed in the centres of bundles of varying sizes, which were then sterilized at 260° F. for thirty minutes, and dried under 10 pounds' pressure in a vacuum for ten minutes. The swabs were then placed into meat broth and incubated for five days at 37° C., after which further plating revealed no growth. The optimum sizes of bundles yielding sterile swabs were 100 napkins (14.5 by 20 by 11.5 inches in size), or 20 sheets (20 by 12 by 16 inches in size).

This method of autoclaving all such linen has proved most satisfactory and obviates all dangers of cross-infection by this route. It is obvious that ample supplies of linen are required.

Overcrowding.

Overcrowding was, and remains, a potent danger in maintaining an epidemic of infection. This prevented the institution of "rooming-in" as recommended by Barber *et alii* (1953), and by Pickerill and Pickerill (1954). Campbell (1954) found that each baby in a communal nursery was handled 28 times in a day by six different nurses and the mother. She advocates "rooming-in", in which the baby, attended only by its mother and a nurse, is handled seven times a day, thus "reducing the number of hands and noses coming in contact with the child".

It was possible to rectify the close proximity of many of the cots in the nurseries by the provision of extra cot-carriers, permitting separation of at least 12 inches. The dangers arising from single gauze nets for protection against flies covering rows of six cots were obvious, and these were replaced by individual covers.

Bathing of Babies.

Oiling of skins, frequent bathing, *et cetera*, appeared to be unjustifiable interference with the newborn babies, more likely to promote contamination than to prevent it. Recently, the honorary paediatricians on the hospital staff discontinued all oiling of the newborn, all bathing until just before the baby's discharge from hospital, and all routine eye lotions. Soiled areas are being cleansed with sterile water only. These regulations have been in force for only a short period, and so far the infection rate appears to be decreasing.

As far as possible, toilet procedures at communal benches have been eliminated, as suggested by Allison and Hobbs (1947).

Attention has also been paid to the methods of disposal of soiled napkins and other linen, and to the prevention of contamination of swabs, lotions, *et cetera*.

General Measures.

As a few babies developed infected wounds after circumcision, this practice was discontinued in public hospital cases. Isbister (1954) and Campbell (1954) both agree that routine circumcisions are dangerous from the infection viewpoint. Campbell mentions two cases of fatal septicæmia following circumcision.

The question of oiling blankets, as suggested by Rountree and Armytage (1946) and by Rountree (1947, 1951) was considered, but regarded as impracticable, with the limited laundry facilities available.

As overcrowding caused sterilizers to be taxed to their utmost, it was a common practice only to rinse bedpans after their use by patients. However, arrangements were made to boil them every time they were used. Pan covers were potential sources of cross-infection, as they were used over and over again, and discarded only when obviously soiled. The shortage of covers was remedied, and a clean cover was provided every time a bedpan was used.

Provision of an adequate number of breast trays overcame the dangers of cross-infection when several patients shared the same trays.

DISCUSSION.

Although the bacteriological aspects are of fundamental importance, we have attempted to present this paper from the clinical viewpoint, in the hope that some of our findings may be of assistance to others.

Certain of the investigations are incomplete, and staphylococcal infections have not been eradicated completely. However, the improvements achieved are apparent.

There have been many difficulties to overcome. Lack of finance has been a barrier, and until extensions are added to the hospital, the dangers of overcrowding and cross-infection will remain.

SUMMARY.

Some aspects of an epidemic of staphylococcal infection in a maternity hospital have been considered. After mention of some of the initial problems encountered, the bacteriological features have been analysed in three main groups—namely, staff, mothers and babies. As well as infections among members of the nursing staff, the nasal carrier rate of staphylococci has received attention. Genital tract and breast infections in the mothers have been discussed, and reference has been made to a special investigation into the possible aetiology of breast infection and its connexion with breast engorgement, and also into the relationship of maternal and neonatal infections. Eye and skin infections, enteritis and infections in premature babies have been discussed in the section on infections in the newborn. Significant trends with regard to "Terramycin" and penicillin sensitivities of staphylococci have been analysed. Certain clinical aspects have been considered, and reference has been made to treatment of these infections. The steps taken to overcome the epidemic have been described. Of particular importance have been the autoclaving of linen and measures to prevent cross-infection by hand.

ACKNOWLEDGEMENTS.

We wish to thank Dr. Phyllis Rountree for her assistance in carrying out phage-typing, and also Mr. N. S. Stenhouse, of the Commonwealth Scientific and Industrial Research Organization, for performance of the statistical analyses.

BIBLIOGRAPHY.

- ALLISON, V. D., and HOBBS, B. C. (1947), "An Enquiry into the Epidemiology of Pemphigus Neonatorum", *Brit. M. J.*, 2: 1.
 BARBER, M., WILSON, E. D. R., RIFFON, J. E., and WILLIAMS, R. E. O. (1953), "The Spread of *Staphylococcus Aureus* in a Maternity Department in the Absence of Severe Sepsis", *J. Obst. & Gynaec. Brit. Emp.*, 60: 476.
 CAMPBELL, K. (1954), "Cross Infection in the Neo-Natal Nursery", *M. J. AUSTRALIA*, 2: 329.
 CAPON, N. B. (1955), "The Paediatrician's Part in the Maternity Services", *Brit. M. J.*, 1: 803.
 CHURCH, B. D., and LOOSLI, C. A. (1953), "Role of the Laundry in the Re-contamination of Washed Bedding", *J. Infect. Dis.*, 93: 65.
 CLARKE, S. K. R., DAGLEISH, P. G., PARRY, E. W., and GILLESPIE, W. A. (1954), "Cross Infection with Penicillin Resistant *Staphylococcus Aureus*", *Lancet*, 2: 211.
 COLLINS, V. L. (1954), part of a symposium on "Cross Infection in the Hospital" held at the annual meeting of the Australian Paediatric Association, Canberra, April 8 to 11, 1954, *M. J. AUSTRALIA*, 2: 364.
 CUNLIFFE, A. C. (1949), "The Incidence of *Staphylococcus Aureus* in Ante-Nares of Healthy Children", *Lancet*, 2: 911.

- EDMONDS, P. N., ELLIS-JONES, T. F., FORFAR, J. O., and BALF, C. L. (1955), "Pathogenic Staphylococci in the Environment of the Newborn Infant", *Brit. M. J.*, 1: 990.
- FINLAND, M., and HAIGHT, T. H. (1953), "The Antibiotic Resistance of Pathogenic Staphylococci", *Arch. Int. Med.*, 91: 145.
- HARDYMENT, A. F. (1954), "The Control of Infections in the Newborn", *Canad. M. A. J.*, 70: 379.
- HOBBS, B. C., CARRUTHERS, H. L., and GOUGH, J. (1947), "Sycosis Barbæ; Serological Types of Staphylococcus Pyogenes in Nose and Skin and Results of Penicillin Treatment", *Lancet*, 2: 572.
- ISRIESTER, C., DURIE, E. B., ROUNTREE, P. M., and FREEMAN, B. M. (1954), "A Further Study of Staphylococcal Infection of the Newborn", *M. J. AUSTRALIA*, 2: 397.
- KNOTT, F. A., and BLAICKLEY, J. B. (1944), "The Control of Staphylococcus Aureus Infections in a Maternity Department", *J. Obst. & Gynec. Brit. Emp.*, 51: 386.
- LOWBURY, E. J. L. (1955), "Cross-Infection of Wounds with Antibiotic Resistant Organisms", *Brit. M. J.*, 1: 985.
- LUDLAM, G. B. (1953), "Incidence and Penicillin Sensitivity of Staphylococcus Aureus in the Nose in Infants and their Mothers", *J. Hyg.*, 51: 64.
- MEDICAL RESEARCH COUNCIL, Cross Infection in Hospitals Committee (1951), "The Control of Cross Infection in Hospitals", Medical Research Council Memorandum Number 11.
- MURRAY, J., and CALMAN, R. M. (1955), "Control of Cross-Infection by Means of an Antiseptic Hand Cream", *Brit. M. J.*, 1: 81.
- NAISH, F. C. (1947), "Breast Feeding", London, Oxford University Press.
- PICKERILL, C. M., and PICKERILL, H. P. (1954), "Elimination of Hospital Cross-Infection in Children", *Lancet*, 1: 425.
- ROUNTREE, P. M., and ARMYTAGH, J. E. (1946), "Hospital Blankets as a Source of Infection", *M. J. AUSTRALIA*, 1: 502.
- ROUNTREE, P. M. (1947), "Cross-Infection of Wounds in a Surgical Ward during a Trial of the Use of Oiled Blankets", *M. J. AUSTRALIA*, 1: 427.
- ROUNTREE, P. M. (1951), "Cross-Infection of Surgical Wounds", *M. J. AUSTRALIA*, 2: 767.
- ROUNTREE, P. M., FREEMAN, B. M., and BARBOUR, R. G. H. (1954), "Nasal Carriage of Staphylococcus Aureus in the General Population and its Relationship to Hospitalization and to Penicillin Therapy", *M. J. AUSTRALIA*, 2: 467.
- RUBBO, S. D. (1955), personal communication.
- SHERRIF, J. C., and FLOREY, M. E. (1951), "The Relation of Penicillin Sensitivity in Staphylococci to Clinical Manifestations of Infection", *Lancet*, 1: 309.
- WALLACE, A. T., and DUGUID, J. P. (1952), "Staphylococcus Aureus Air Infection in a Maternity Hospital", *Edinburgh M. J.*, 49: 200.
- WALLER, H. K. (1939), "Clinical Studies in Lactation", London, Heinemann.
- WALLMAN, I. S., GODFREY, R. C., and WATSON, J. R. H. (1955), "Staphylococcal Pneumonia in Infancy", *Brit. M. J.*, 2: 1423.

INTERMITTENT CLAUDICATION: I. CLINICAL ASPECTS.

By A. J. BARNETT and A. ST. CLAIR,
From the Baker Medical Research Institute and
Clinical Research Unit, Alfred Hospital,
Melbourne.

Of the symptoms of occlusive arterial disease of the lower limbs, intermittent claudication is the commonest and least amenable to treatment. The place and effectiveness of any new treatment for claudication, such as arterial grafting, can be assessed only against a factual background of the clinical features and natural history of the disease and its pathological anatomy and physiology; but although many papers have been written on claudication they usually either discuss it in a general way or deal with only one facet.

In this paper we shall describe the clinical aspects—the type of patients in whom the symptom occurs, their disablement, and the clinical and arteriographic findings in their limbs, based on records of some 125 patients examined by one of us in the past five years. The only criteria for selection were the presence of claudication when the patient presented, availability of records, and reasonable certainty (from the description of the symptom and the clinical findings) that the patient had true muscular ischemic pain.

Patient Material.

Age and Sex.

Most of the patients when examined by us were in their sixth or seventh decade, with a mean age of sixty years; they had suffered from claudication for various periods (with an average of two years), and the mean age of onset was fifty-eight years (Table I and Figure I).

TABLE I.
Age Incidence of Claudication.

Age. (Years.)	At Onset.	At Presentation.
20+	1	0
30+	6	4
40+	22	18
50+	37	36
60+	46	47
70+	11	18
80+	2	2
Total ..	125	125

Of the 125 patients studied, there were 105 males and 20 females—a sex incidence of approximately five men to one woman.

Diagnosis.

The clinical diagnosis was as follows: atherosclerosis obliterans, 109 cases; thromboangiitis obliterans, seven

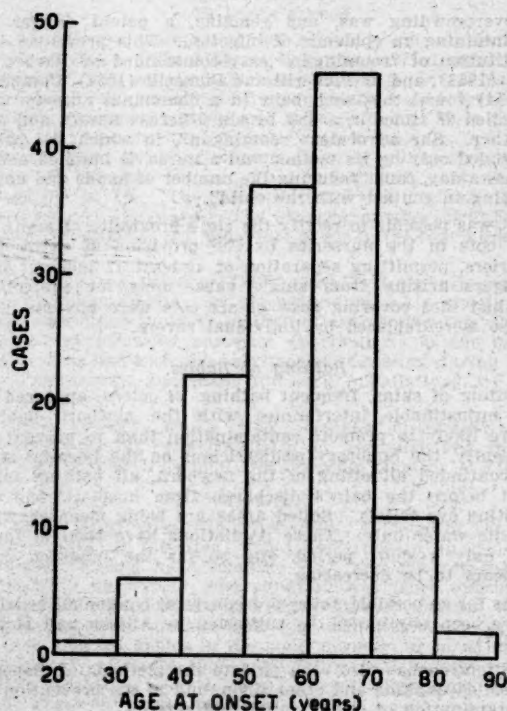


FIGURE I.

Histogram showing age of onset of claudication in 125 cases.

cases; Leriche's syndrome (thrombotic occlusion of the lower end of the aorta and iliac vessels), three cases; traumatic thrombosis, two cases; polyarteritis nodosa, one case; no definite diagnosis (see below), three cases.

Important points leading to the diagnosis of *thrombo-angitis obliterans* were the onset of vascular symptoms in early life (under the age of forty years) and the progressive nature of the disease. The term is therefore used as a purely descriptive one and does not imply a particular pathological picture, such as that described by Buerger (1908). It probably includes cases which would be described by Boyd and his co-workers (1949) as "juvenile obliterative arteritis".

The three cases in which no definite diagnosis was made need brief mention.

A woman, aged forty-nine years, stated that after cholecystectomy some seven months previously she had been limited in her walking by aching in her thighs causing her to stop and eased by resting, and also that her feet were cold and white. On examination of the patient, both her femoral pulses were weak and delayed (when compared with the radial pulses); oscillometric readings showed uniform impairment in the thighs and calves. Aortography (Figure II) revealed a localized occlusion of the aorta with a well-developed collateral circulation.

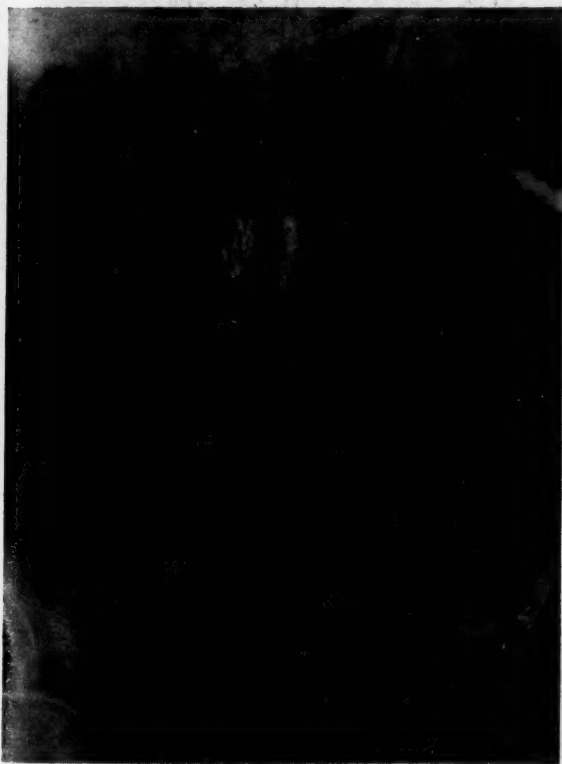


FIGURE II.

Aortogram showing localized occlusion of abdominal aorta with collateral circulation.

A diabetic woman, aged thirty-seven years, had noticed cold feet for the past ten years, and for the past four months pain in her thighs and calves, particularly the right, on walking 150 yards, and relieved by resting for a few minutes. Both femoral pulses were weak, and, except for weak posterior tibial pulses, no other pulses could be felt in the lower limbs. Oscillometric readings were reduced in both thighs and both calves. Aortography showed that the lower part of the abdominal aorta and the iliac vessels were small, but not otherwise abnormal. Arteriography showed that the left femoral artery (Figure III) was of moderately small calibre, and the right of extremely small calibre.

A man, aged forty-three years, employed as a meat clerk, an occupation requiring him to spend a large part of each day in refrigerated rooms, stated that for four months

he had experienced, on walking, pain in both thighs going down to his feet. This symptom had become more severe, and his walking distance had been reduced eventually to 10 yards. He had also noticed cramps in his feet at night and occasional numbness in his left thigh. His femoral pulses were normal; on the right side the other lower limb pulses



FIGURE III.

Widespread narrowing of femoral artery of obscure origin.

were weak, and on the left they were absent. Aortography revealed a normal aorta and iliac arteries. Left femoral arteriography revealed two localized blocks.

Although thrombosis in atherosclerotic vessels is a possible cause of this patient's arterial occlusions, this seems rather unlikely in view of his relative youth and the occurrence of symptoms in both lower limbs about the same time.

Associated Diseases.

If a rigid criterion of either a systolic blood pressure over 160 millimetres of mercury or a diastolic pressure over 90 millimetres is used for the diagnosis of hypertension, this was present in 57 cases (or approximately 50%). However, this criterion makes no allowance for the extreme variation in blood pressure and its change with age. In Figure IV the percentages of men suffering from intermittent claudication with various blood pressures are compared with those of men of similar ages not selected because of this symptom (from Hamilton *et al.*, 1954). There is no pronounced difference between the two groups.

Diabetes mellitus was present in 19 patients (15%). A detailed study of the glucose tolerance curves of 33 of the patients included in this study is reported elsewhere by Hamilton (1955), who found that the glucose tolerance of patients with claudication, but without gangrene, did not differ significantly from that of "control" subjects of the same age.

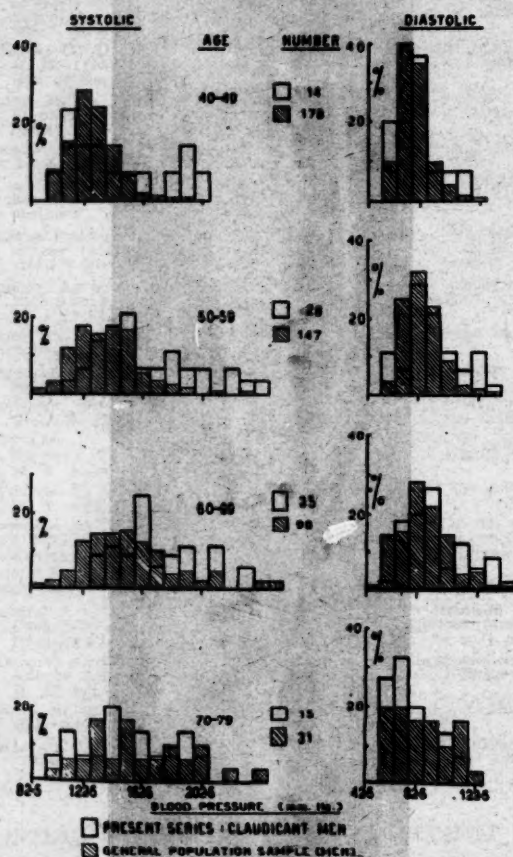


FIGURE IV.

Blood pressures of men with intermittent claudication (in the present series) compared with those of a general population sample, the latter (shaded areas) taken from Hamilton et al., 1954.

Occlusive Arterial Disease Elsewhere than in the Limbs.

In 20 cases there was a history or clinical evidence of ischemic heart disease, in six of cerebral vascular disease, and in two (in addition to the foregoing) of vascular disease in both heart and brain—a total of 28 cases (22%) in which clinical cardiac and/or cerebral vascular disease was present.

Clinical Features.

General Description.

Intermittent claudication is one of the most distinctive symptoms in medicine and has been depicted so frequently in papers and books that no detailed description is necessary. The patient states that although he is without pain when at rest he experiences discomfort in his leg after walking a certain distance, usually localized to a particular muscle mass. At first this is an "ache", but as he continues walking it develops into a "cramping" pain which usually forces him to stop. It then passes off in a period which he usually estimates at about five minutes and he

can then walk some distance before again experiencing similar symptoms.

According to Lewis and his co-workers (1931), although patients complain of "cramp", hardening of the muscles rarely occurs. However, we have found on close questioning that many patients maintain that the muscles "knot

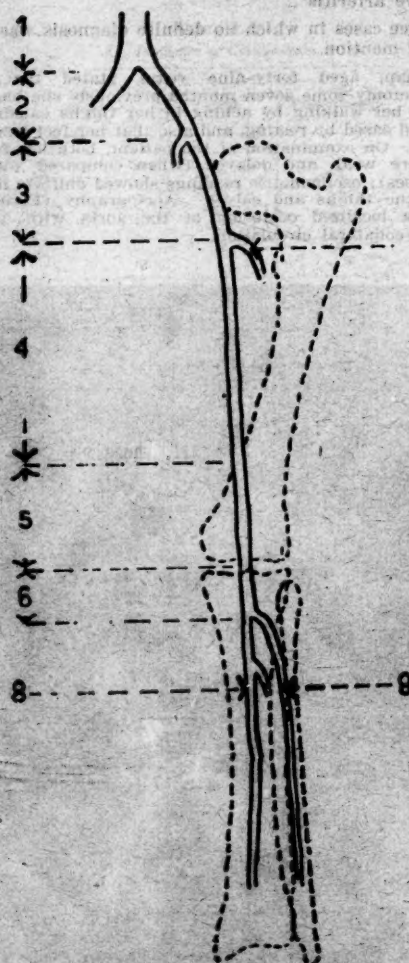


FIGURE V.

Diagrammatic representation of sites of arterial occlusion. (See text.)

up" or become hard to touch. Associated with discomfort in the muscles, or preceding it, many patients experience "pins and needles" or numbness in the ankle or foot, and on inspection during exercise the foot is often seen to blanch. Although patients usually say that their pain lasts about five minutes, under test conditions its duration is much less—thirty to ninety seconds.

The pain of intermittent claudication is rarely confused with that due to other causes. Pain from skeletal or neurological disorder has not the same precise relation to a definite amount of exercise; it may be relieved by exercise or be produced by certain movements. Although pain from deep venous insufficiency has a superficial resemblance to that of intermittent claudication, being produced by exercise and relieved by rest, it is different in character, being described as "bursting", and the limb may be seen to swell; relief by rest is less dramatic, taking about half

an hour, and is obtained more readily if the patient sits or lies with his limb elevated.

Severity.

Boyd and his co-workers (1949) have described three grades of intermittent claudication: type I, in which pain disappears if the patient continues walking; type II, in which pain persists if the patient continues walking, but he does not have to stop; and type III, in which the pain rapidly becomes more severe and the patient is forced

TABLE II.
Walking Distance.

Estimated Walking Distance. (Yards.)	Patients.
100	31
100+	41 } 72 (58%)
200+	22
300+	6
400+	5
500+	9
Not given	11
Total	125

to stop. Of our 125 patients, 12 (10%) had type II claudication and 113 (90%) type III; there were no patients with type I. (Boyd and co-workers state that most patients with claudication belong to type II. Our patients apparently had the disease in a more severe form than those studied by these authors.)

The patients' estimated walking distances varied from a few yards to half a mile, the most frequent estimate being from 100 to 200 yards. It is noteworthy that in 72 cases (58%) claudication was so severe that the walking distance was less than 200 yards (Table II).

TABLE III.
Site of Pain in 185 "Claudicating" Limbs.

Site or Sites.	Number of Limbs.
Single sites:	
Thigh	4
Calf	139
Anterior aspect of leg	1
"Ankle"	1
"Leg"	8
Foot	3
Combined sites:	
Hip, thigh and calf	2
Hip, thigh and anterior aspect of leg	1
Thigh and calf	4
Thigh, calf and foot	1
Thigh, anterior aspect of leg and foot	2
Calf and anterior aspect of leg	8
Calf and foot	11
Total	185

Site.

Although at its onset claudication was almost always unilateral, by the time the patients were examined by us (average of two years from the onset) it had become bilateral in 60 (48%). Occasionally the symptoms had begun on one side and then transferred (usually in a more severe form) to the other side.

The site of the pain in the 185 "claudicating limbs" is given in Table III. The overwhelming predominance of the calf as the site of pain is noteworthy; the calf was the sole site in 139 limbs (75%), and either the sole site or associated with other sites in 160 (86%).

Pulse Findings.

The state of the pulses in claudication in various sites may give some indication of the site of arterial block in relation to the site of the claudication. An account of the pulse findings in all the sites of claudication would produce a picture too detailed for any clear pattern to be evident. In Table IV we have analysed the state of the pulses according to three large groups of claudication: (i) hips alone or together with regions below; (ii) thighs alone or together with regions below; and (iii) calves alone or with other regions in the lower part of the leg or the foot.



FIGURE VI.

Widespread irregularity and patchy narrowing of femoral artery without segmental occlusion.

The main findings from this table may be summarized as follows. In claudication extending as high as the hip (three cases) there was always abnormality of the femoral pulse. In claudication extending to the thigh (11 cases) the femoral pulse was abnormal in about half. (As would be expected, the popliteal pulse was practically always absent.) In claudication not extending above the knee the femoral pulse was rarely abnormal (11%), but the popliteal artery was abnormal in 78% of cases. As would be expected the ankle pulses were also usually abnormal. It is apparent therefore that in most cases of claudication (about 75%) there was clinical evidence from the pulses of occlusion or narrowing of a major artery above the

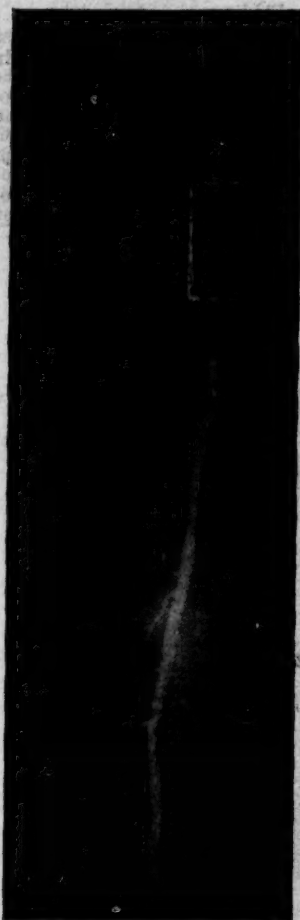


FIGURE VIIA.

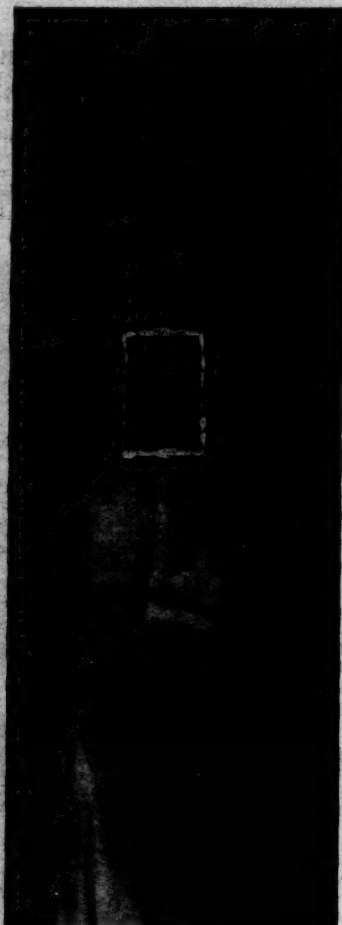


FIGURE VIIB.

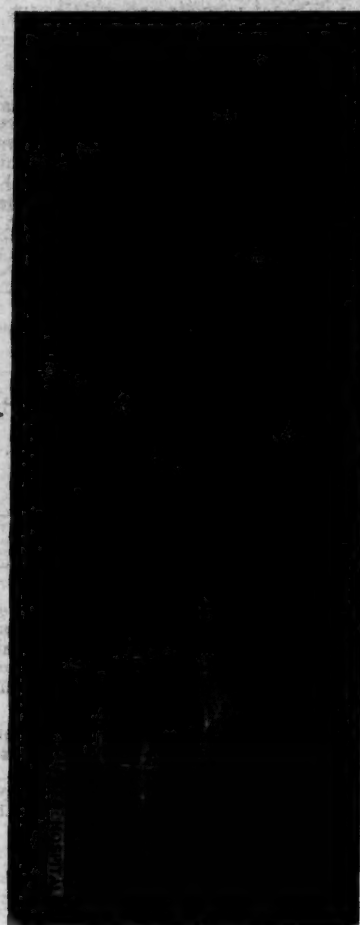


FIGURE VIIC.



FIGURE VIIA (inset).

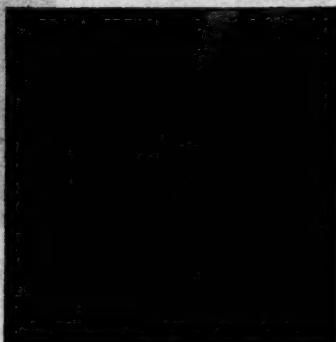


FIGURE VIIB (inset).



FIGURE VIIC (inset).

Pronounced localized arterial narrowing: A, in lower part of superficial femoral artery. B, in upper part of popliteal artery. C, in lower part of popliteal artery. (In this instance the lumen of the whole artery is also grossly irregular from atherosclerosis.)

site of the claudication. In all the claudicating limbs (185) we could find only three instances in which all the peripheral pulses were normal. One of these is of some interest, in that the arterial occlusion affected the *profunda femoris* artery, a rare site:

A man, aged fifty-two years, stated that for the past seven or eight months he had suffered from a pain like a toothache down the front of the right thigh and occasionally just below the knee on walking. More recently this had become more severe, and had often made him stop after walking for 100 yards. It was eased in five to ten minutes. All peripheral

pulses were normal in both legs. A straight X-ray picture showed slight calcification of the right femoral artery and pronounced calcification of the *profunda femoris* artery. There seems little doubt that this patient's symptoms were due to occlusion of this vessel, the axial vessels remaining patent.

The pulse findings indicate that in practically all instances claudication is associated with occlusive disease of the main (axial) blood vessels, and it is not necessary

TABLE IV.

State of Peripheral Pulses in Intermittent Claudication of Different Distributions.¹

Site.	Pulse.	Absent.	Weak.	Normal.	Total.
Hips and other regions.	Femoral.	2	1	0	3
Thighs and other regions. ²	Femoral.	1	5	5	11
	Popliteal.	9	0	2	11
Calf and other regions. ²	Femoral.	3 (2%)	14 (9%)	133 (89%)	149
	Popliteal.	86 (57%)	32 (21%)	32 (22%)	149
	Dorsalis pedis.	110 (73%)	24 (17%)	16 (11%)	149
	Posterior tibial.	119 (80%)	19 (13%)	12 (8%)	149

¹ A few limbs in which the pulses have not been fully documented have been excluded from this table.

² Not including the cases already included in the classes above.

to postulate disease of muscular branches, although this may, of course, be present in addition.

TABLE V.

Nature and Site of Block Shown by Arteriography in 54 "Claudicating" Limbs.

Nature of Block.	Site (see Figure V).	Number of Instances.
No localized block; widespread narrowing and irregularity.	Widespread	12
Marked local narrowing.	Common iliac 2 Superficial femoral 4 Upper part of popliteal 5 Lower part of popliteal 6	1 1 1 1 } 4
One complete block	Aorta ¹ 1 Common iliac 2 External iliac and common femoral 3 Superficial femoral 4 Superficial femoral and upper part of popliteal 4-5 Upper part of popliteal 5 Whole popliteal 5-6 Lower part of popliteal 6 Tibial vessels 8-9 Superficial femoral and whole popliteal 4-5-6 Superficial femoral, popliteal and tibial arteries 4-5-6-8-9	1 1 1 10 12 4 1 1 1 1 1 1 } 34
Multiple blocks . .	Upper part of popliteal, lower part of popliteal and tibial vessels 5; 6-8-9 Popliteal; posterior tibial 5; 8 Superficial femoral and upper part of popliteal; lower part of popliteal and tibial 4-5; 6-8-9 External iliac and common femoral; superficial femoral 3; 4	1 1 1 1 } 4

¹ The single instance of a block in the aorta is counted as one (although claudication occurred in both limbs), because there was a single lesion. In the other instances in which claudication occurred in both limbs of the same patient, there was a lesion on each side.

Of the 65 patients with unilateral claudication the pulses in the other limb were fully investigated in 61. In 37 instances there was some abnormality in this limb: abnormal femoral pulses were noted in one case, abnormal popliteal pulses in 14 and abnormal ankle pulses in all 37.

Other Ischemic Features in Limbs.

Of the 125 patients with claudication, 73 (59%) had other ischemic symptoms such as coldness, paresthesia and rest pain in the "claudicating" leg or legs. These were often only of a minor nature and were elicited only on direct questioning of the patient. Only eight (6%) had ischemic ulceration. In one patient the other leg had been amputated for ischemic necrosis.

TABLE VI.

Severity of Atheroma at Particular Sites.

Artery.	Grade of Irregularity (from Atheroma).				Total.
	0	1	2	3	
Femoral	2	12	13	10	37
Upper part of popliteal	16	16	4	4	40
Lower part of popliteal	25	12	1	2	40

Arteriographic Findings.

Angiography was performed in 46 of the 125 cases (aortography alone in three, aortography and femoral arteriography in four, femoral arteriography alone in 39). A percutaneous injection technique was employed with

TABLE VII.

Extent of Collateral Vessels in Subjects with Claudication of Various Durations.

Duration of Symptoms (Months.)	Collateral Vessels.				Total.	Number with Grades 0 to 1 Collateral Vessels.
	0	1	2	3		
0+	1	2	1	0	4	3
3+	0	3	4	0	7	3
6+	1	3	3	5	12	4
12+	0	6	13	10	29	6
Total	2	14	21	15	52	

diodone as contrast medium, and pictures were taken in rapid succession with the use of a film changer. Since the investigation was made for diagnostic rather than for research purposes and mainly as an aid to the selection

TABLE VIII.

Site of Arterial Occlusion in Claudication Affecting Various Sites.¹

Site of Claudication.	No Localized Block.	Localized Block Site. (See Figure V.)						Multiple Blocks.	Total.
		1	2, 3	4-6	8, 9	4-9			
Thigh and regions below	1	1	—	1	—	—	—	—	3
Calf alone	4	—	2	27	1	1	—	4	39
Calf and anterior aspect of leg	2	—	—	2	—	—	—	—	4
Calf and foot	4	—	1	1	—	—	—	—	6
Anterior aspect of leg	—	—	—	1	—	—	—	—	1
"Leg"	1	—	—	—	—	—	—	—	1
Totals	12	1	3	32	1	1	4	—	54

¹ In this table the instances of pronounced local narrowing have been regarded as localized blocks.

of patients for arterial surgery, the subjects belong to a somewhat selected group. With the technique used the picture of the arterial tree was incomplete, being limited by the size of the film used in the film changer. Although

for these reasons we cannot give an over-all picture of the arteriographic findings in intermittent claudication; our findings indicate the types of lesions occurring in those cases in which arteriography is performed as an aid to clinical diagnosis.

In 27 of the 34 limbs with one complete arterial block a patent major vessel was shown below the block, so that arterial grafting was anatomically feasible (although frequently not performed because of the nature of the vessels and other factors). Because of technical difficulties



FIGURE VIIIa.

Segmental arterial occlusion in common sites: A, in superficial femoral artery; B, in superficial femoral and upper part of popliteal artery. Note also the great variation which may occur in the number of collateral vessels.

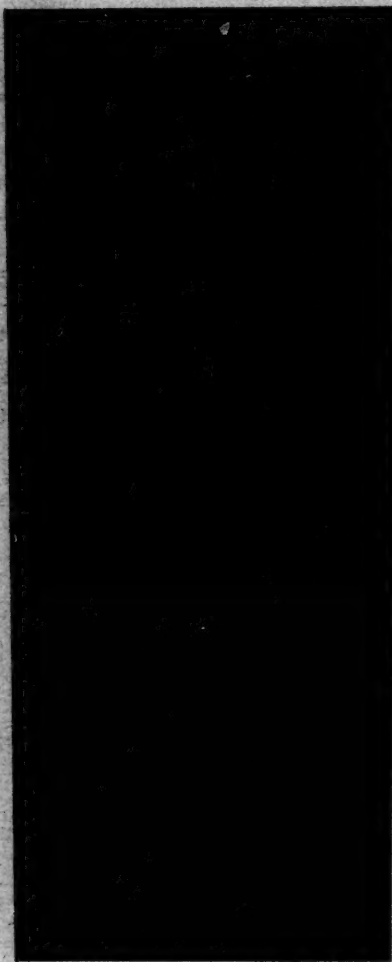


FIGURE VIIIb.

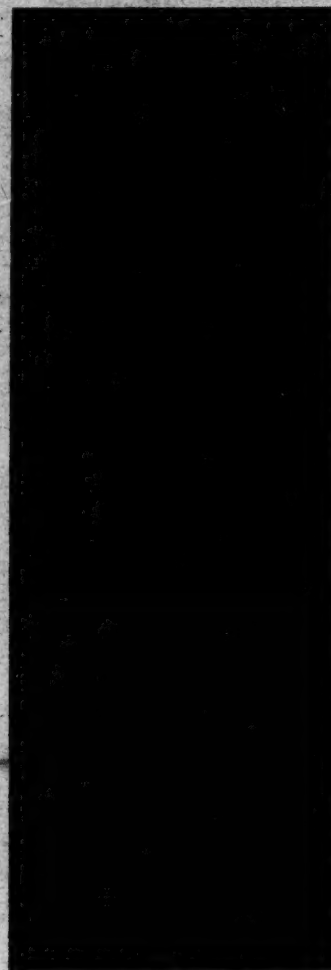


FIGURE IX.

Multiple arterial blocks in upper part of popliteal artery and in both tibial arteries.

Nature and Site of Arterial Block.

The possible sites of arterial block are indicated diagrammatically in Figure V, and the nature and site of the block in 54 limbs are listed in Table V.

In 12 cases no localized block was demonstrated, but there was widespread irregularity and narrowing of major arteries (Figure VI), in four there was extreme narrowing of the arterial lumen over a length of less than one centimetre (Figure VII), in 34 there was one complete block (Figure VIII), and in four there were multiple blocks (Figure IX). The commonest sites of occlusion were the superficial femoral artery and the upper part of the popliteal artery; occlusion occurred in these regions in 26 of the 34 cases with one complete block and in two of the four cases with pronounced local narrowing. The length of artery occluded varied from 0.5 to 34 centimetres, but was usually between five and 15 centimetres.

the region of the bifurcation of the popliteal artery was clearly shown in only 31 of the total 54 cases. Both tibial arteries were patent in 26, both were blocked in four, and the posterior tibial artery alone was blocked in one.

In all except five of the 54 cases the clinical diagnosis was *atherosclerosis obliterans*. In none of these five was there a block limited to the superficial femoral artery and the upper part of the popliteal artery, the most common sites in atherosclerosis.

Degree of Atheroma in Femoral and Popliteal Arteries.

When an adequate length of artery was displayed, the degree of irregularity (taken as an index of atheroma) was graded qualitatively (from 0 to 3), with the results shown in Table VI. The figures give only an indication of the relative severity of atheroma, because if a particular

segment was completely blocked it could not be given a score. The femoral artery was commonly blocked, but the lower part of the popliteal artery only rarely. Since it is likely that the occluded segment was the site of severe atheroma, the relatively favourable state of the lower part of the popliteal artery is probably more pronounced than is indicated in Table VI. In only one instance was atheroma more pronounced in the lower part of the popliteal artery than at the higher level. The relative freedom from atheroma of the lower part of the popliteal artery with pronounced atheroma at a higher level is illustrated in Figure X.

Collateral Vessels.

In the 52 cases in which pictures of adequate quality were obtained, the extent of collateral vessels was graded. (Table VII). Although the proportion of patients with poor collaterals (grade 0 to 1) decreases with increasing duration of symptoms, apparently other factors are concerned. Although in six of the 16 cases in which poor collaterals were present the duration of claudication was less than six months, in the other 10 it was longer than this period. In five of the latter there was no complete block, in five there was a localized block. The numbers are too small for any deduction of the reason for the poor collaterals in these cases.

Site of Claudication in Relation to Site of Block.

The site of arterial occlusion in claudication affecting various regions is shown in Table VIII. This shows that in most cases of claudication it is possible to demonstrate a block in a proximal large artery. In a few instances no localized block but widespread arterial irregularity was found. In only one instance of claudication in the calf were the tibial vessels found to be blocked alone. The arteriographic findings therefore confirm the view previously obtained from a study of the arterial pulses that claudication is usually associated with an obstruction in a proximal large artery. There is good correlation between the state of the pulses and the position of the block as shown by arteriography.

Discussion.

Although claudication is but one symptom of occlusive arterial disease, it is the commonest initial and presenting symptom (Barnett and Fraser, 1955), and by study of its clinical features we obtain a picture of occlusive arterial disease in its earliest clinical stage, when it might be thought that it would be most amenable to treatment.

Boyd and his co-workers (1949) wrote on the clinical aspects of intermittent claudication, basing their findings on 472 cases of "obliterative arteritis" of the lower limbs, but unfortunately the incidence of the various features is not given. We cannot find any report similar to our own with tabulation of the incidence of the various clinical features given in this paper and so cannot compare our results in detail with those of other workers. However,

a brief comment may help in "high-lighting" what we consider the important points in the picture.

Claudication is essentially a disease of males (the ratio of males to females is 5:1). The commonest age incidence is from forty to seventy years, so that although most of the subjects are at middle age or beyond they have not necessarily reached the age when their activity is curtailed by "senility"; treatment is therefore highly desirable. The usual cause of the symptom is atherosclerosis. Although the maximum incidence occurs in particular regions, this is a generalized disease and it is not surprising therefore that about one-fifth of the patients had clinical evidence of cardiac or cerebral vascular disease as well. About 60% had abnormalities of the pulses in the other leg.

The disability from intermittent claudication is generally severe, with an estimated walking distance of under 200 yards in about 60% of patients. Although the pain may affect various muscle groups in the leg, it occurs predominantly in the calf muscles (in 86%). Although claudication is often the only prominent symptom, other minor symptoms

of ischaemia are commonly found by direct questioning.

Examination of the pulses usually indicates an obstruction of large arteries proximal to the site of pain. In most instances in which arteriography was performed it was possible to demonstrate a localized block in a large artery, although in some there was widespread narrowing and no local block. The most frequent sites of occlusion were the superficial femoral or the upper part of the popliteal artery. When the region of the bifurcation of the popliteal artery was displayed, the tibial vessels were commonly found to be patent.

These findings are at variance with those of Veal and McFetridge (1936) that claudication is usually due to obstruction of small arteries to muscles, and are in line with those of the majority of observers (Leriche *et al*, 1937; Krahle *et al*, 1954; Lowenberg, 1954; Mavor, 1955) that there is usually a segmental obstruction in a large

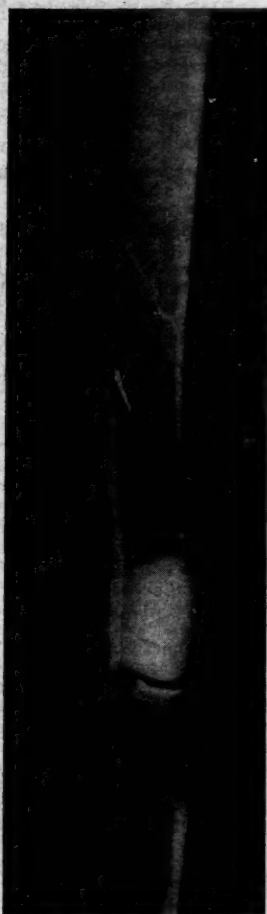


FIGURE Xa.

Two instances of gross irregularity of lumen of femoral artery and upper part of popliteal artery from atherosclerosis, with relative immunity of lower part of popliteal artery.



FIGURE Xb.

artery. Further confirmation of this view is given by the complete relief of claudication following arterial grafting in these cases.

A remarkable feature is the decreased severity of atheroma in the lower part of the popliteal artery compared with that of the superficial femoral and upper part of the popliteal artery, a finding previously reported by Lindbom (1950). This indicates that the lower part of the popliteal artery is a suitable site of anastomosis in arterial surgery. There is a tendency for the extent of collateral vessels to increase with the duration of symptoms; but absence of good collateral vessels cannot always be explained by the time factor.

Summary.

The clinical aspects of intermittent claudication are described from a study of 125 patients (185 limbs). Arteriography was performed in 46 cases (54 limbs).

Males predominated in the proportion of 5:1.

The highest age incidence was from forty to seventy years.

Atherosclerosis was the commonest cause. About one-fifth of the patients had evidence of cerebral or cardiac vascular disease.

Claudication is essentially due to pain in the calf, and often produces considerable limitation of activity (walking distance under 200 yards). It is often bilateral (50%).

Pulse findings usually indicate, and arteriography usually shows, a block in a large vessel. This is most frequently in the superficial femoral artery or the upper part of the popliteal artery.

There is usually a patent large vessel below the block and the origins of the tibial arteries are usually patent. The severity of atheroma usually decreases with descent of the vessel from the superficial femoral to the lower part of the popliteal artery.

Acknowledgements.

Our thanks are due to Dr. T. E. Lowe, Director of the Baker Medical Research Institute and the Clinical Research Unit, Alfred Hospital, for helpful criticism in the production of this paper; to Dr. B. L. Deans, Director, and other members of the staff of the Department of Diagnostic Radiology, Alfred Hospital, for the arteriographic studies; and to Mr. T. O'Connor, photographer to the Alfred Hospital, for the illustrations.

References.

- BARNETT, A. J., and FRASER, J. R. E. (1953), "Peripheral Vascular Disease", Melbourne University Press, 114.
- BOYD, A. M., RATCLIFFE, A. H., JEPSON, R. P., and JAMES, G. W. H. (1949), "Intermittent Claudication: A Clinical Study", *J. Bone & Joint Surg.*, 31B: 325.
- BURGER, L. (1908), "Thromboangitis Obliterans: A Study of the Vascular Lesions Leading to Presenile Spontaneous Gangrene", *Am. J. M. Sc.*, 136: 567.
- HAMILTON, M. (1955), "Carbohydrate Tolerance of Patients with Peripheral Vascular Disease", *Alfred Hosp. Clin. Rep.*, 5: 29.
- HAMILTON, M., PICKERING, G. W., ROBERTS, J. A. F., and SOWRY, G. S. C. (1954), "The Aetiology of Essential Hypertension. 1. The Arterial Pressure in the General Population", *Clin. Sc.*, 13: 11.
- LEITCH, R., FONTAINE, R., and DUPERTUIS, S. M. (1937), "Arterectomy with Follow-up Studies on 78 Operations", *Surg., Gynec. & Obst.*, 64: 149.
- LEWIS, T., PICKERING, G. W., and ROTHCHILD, P. (1931), "Observations upon Muscular Pain in Intermittent Claudication", *Heart*, 16: 358.
- KRAHL, E., PRATT, G. H., ROUSSELAUT, L. M., and RUECKA, F. F. (1954), "The Collateral Circulation in the Arterial Occlusive Disease of the Lower Extremity", *Surg., Gynec. & Obst.*, 98: 324.
- LOWENBERG, E. L. (1954), "Arteriosclerosis Obliterans in the Lower Extremities, Its Segmental Nature and Surgical Implications", *J. Internat. Coll. Surgeons*, 21: 297.
- MAVOR, G. E. (1955), "Intermittent Claudication and Sympathectomy", *Lancet*, 2: 794.
- VEAL, J. R., and McFETTERIDGE, E. M. (1936), "Vascular Changes in Claudication with Note on the Value of Arteriography in this Symptom Complex", *Am. J. M. Sc.*, 192: 113.

INTERMITTENT CLAUDICATION: II. NATURAL HISTORY.

By J. K. FRANCIS¹ AND A. J. BARNETT,

From the Baker Medical Research Institute and Alfred Hospital Clinical Research Unit, Melbourne.

The value of any remedy for intermittent claudication can be assessed only against a background of its natural history. Thus a statement that after a particular treatment a patient's walking distance has increased by a certain amount has little meaning, unless we know the variation in performance from day to day, and whether the natural tendency of the condition is to improve, deteriorate or remain stationary.

In deciding whether treatment is worth while, we have to consider what we regard as clinical improvement. Since some treatments, such as arterial surgery, may cause discomfort and perhaps danger to the patient, their justification can be assessed only if we know not only the natural course of the disease in the limbs, but also the prognosis with respect to atherosclerotic complications elsewhere. A surgeon would not be keen to perform a tedious operation to relieve a symptom if he knew that the majority of his patients would be dead in six months from coronary occlusion. However, in spite of the need, there is little detailed information on the natural history of intermittent claudication. In this paper we shall present observations based on a study of patients with this symptom over a period of several years. The observations were made during the following two lines of study: first, an investigation of the progress of the patient's symptom assessed by a step test; secondly, a clinical study based on progress notes and a questionnaire.

Investigation by Step Test.

Although the best test of a patient's walking distance is normal walking, we have found that the patient's statement on his performance is often not trustworthy. Various methods have been devised to measure the ability to walk or of the leg muscles to perform work—for example, by the use of a "claudicometer" (Boyd *et al.*, 1949) or "ergograph" (Shepherd, 1950); but the main requirements are that the test shall bear a constant relationship to the distance walked, and that it can be performed under standard conditions. In the step test the patient is asked to continue walking over two steps, each nine inches high, until he develops pain. Between ascents of the steps he usually walks four to six paces to complete the circuit. The test on any one patient is performed at approximately the same hour on the same day of each week; he is encouraged to walk at approximately the same pace at each test. For most of the year the tests have been performed with the room temperature at 23° C. ($\pm 1^\circ$ C.), although this has not been possible on some particularly hot days in summer. Three tests are performed on any one day, with a rest of at least five minutes between them. At each test an observer records the number of circuits and time before the development of pain, and the time for its disappearance after the patient stops walking. Twenty-three patients were observed by step tests for over twelve months.

Variability of Performance.

Considerable variation was noted not only between the patient's performance in different tests on the same day, but also between the average performances on different days. To investigate the variation in performance we have studied the records of 15 patients who have attended weekly for a period of one year, and have taken as an index of variability the standard deviation of the number

¹ Michaelis Fellow, 1956.

² Although 23 patients were observed for over twelve months, the records of all 23 are not suitable for analysis for all purposes described in this paper. Thus some patients attended only irregularly and this made the records unsuitable for a study of variability.

of circuits before pain was experienced in 12 successive tests (performed over a period of four weeks) expressed as a percentage of the mean. Arbitrarily, a standard deviation below 20% may be taken as low variability, 20% to 30% as moderate variability, and over 30% as high variability. The findings are summarized in Table I, which

TABLE I.
Variability of Step Test Performance Based on 12 Successive Tests.

Initial.		After Twelve Months.	
Variability.	Patients.	Variability.	Patients.
Low (S.D. <20%) ..	8	Low S.D. <10% ..	5
		S.D. 10% to 15% ..	9
		S.D. 15% to 20% ..	1
Moderate (S.D. 20% to 30%) ..	6	Moderate	0
High (S.D. >30%) ..	1	High	0

¹ Standard deviation.

shows that although in the early stage a proportion of patients showed moderate variability, after twelve months' "training" all had low variability. The variability after three months was identical with that at twelve months. In spite of the decrease in variability with "training", occasional unexplained outlying figures were frequently noted—for example, ranges of 21 to 43 and 12 to 40 circuits were recorded.

Effect of Season.

Since some patients stated that their walking distance was greater in winter than in summer, the possible effect of season on step test performance must be considered in assessing the response to treatment. We have analysed the records of 18 patients on whom careful observation was made in both winter and summer of the same twelve months, with the results shown in Table II. These findings give no support for the idea that the step test performance is likely to change with season. Rather there seems a tendency for the performance to improve, whatever the season in which the observation is commenced.

Effect of Treatment.

During the course of the study, many of the patients have received various forms of treatment. Some of these have been deliberate placebos (such as intravenous injection of saline to act as a control for intraarterial injections of vasodilator drugs, intramuscular injections of water as control for intramuscular injections of heparin, and oral administration of tablets of calcium lactate as control for oral administration of "Ronicol"),¹ and others² were treatments held by other workers to be beneficial. The results are summarized in Table III.

The "placebo" methods were usually employed prior to the "active" treatments. None of the active treatments were superior to deliberate placebos.

General Progress.

The initial and final step test performance of 23 patients with claudication of various durations who were followed by means of a step test for twelve months or longer (in some cases up to three years) showed approximately equal numbers improved (13) and unchanged (10). None was worse. The proportion of patients improved was highest

among those with the shortest duration of claudication (under six months).

Clinical Study.

For more general information on the progress of patients' symptoms and particularly on the development elsewhere of complications of atherosclerosis, we have studied patients' clinical records supplemented by a questionnaire circulated to a group who have had claudication for more than two years.

From a total of 125 patients with intermittent claudication examined in hospital practice over about five years, 51 were selected for study of the natural history of the condition, and a questionnaire was sent to them designed to elicit information concerning the progress of their claudication, the development of other circulatory troubles in their legs and their general health.

TABLE II.
Change of Step Test Performance with Season.

Season when Patients Presented.	Step Test Performance ¹ in Succeeding Winter or Summer.			Total.
	Less.	Unchanged.	More.	
Summer	1	5	5	11
Winter	0	2	5	7

¹ A significant change in the step test performance is taken arbitrarily as one of more than 20% of the original performance. In the case of a man with a mean step test performance of 10 circuits, representing a walking distance of 100 yards, a 20% improvement would represent an increase to only 120 yards.

The only criterion for selection was that they had been examined by one of us (A.J.B.) at least two years prior to the collection of data for this report, and thus a reasonable time had elapsed in which to follow their progress. Some had been examined much earlier than this (as long as five years ago), and the claudication had been present for various periods (from a few months up to fifteen years) before they came to our clinic. The patients' statements in their answers to the questionnaire¹ were analysed together with the available clinical data to study the natural history of the disease with particular reference to the following: (a) the development of complications of the underlying disease (usually atherosclerosis) in other regions; (b) the progress of occlusive arterial disease in the limbs, particularly in respect to development of severe distal ischaemia (as manifested by ischaemic necrosis and severe rest pain) and progress in the severity of the claudication.

The basic data from the 51 patients used in this study are presented briefly in Table IV. The patients were mainly men, mostly aged from fifty to seventy years, and the commonest cause of the symptoms was *atherosclerosis obliterans*. Although some features of distal ischaemia were present in about half the patients, these were often of a minor nature—cold feet and numbness. Evidence of atheroma in heart and brain was noted in about one-fifth of the patients.

Follow-up Status, Deaths and Survival Rate.

Of the 51 patients, information at the time when the questionnaire was sent out was obtained in relation to 41. Of these, 31 were alive and 10 were dead. Clinical records

¹ The questionnaire was worded as follows:

1. Since your last visit to the hospital has the distance you can walk before getting pain in the leg: remained the same, increased, decreased?
2. Have you developed any new troubles in your legs? Yes, no. If so, what type?
3. Have you suffered from any other illnesses? Yes, no. If so, what type?
4. How is your general health compared with that at your last visit? Same, better, worse. If worse, which are your present complaints?
5. Would you be willing to attend for an interview? Yes, no.

¹ "Ronicol" (Roche) is β -pyridyl carbinol.

² Heparin was given bi-weekly by intramuscular injection in a dose of 10,000 units, treatment being continued for three months or longer (Newman and Barnett, 1954). Histamine was given into an artery as an infusion containing one to two milligrammes of histamine acid phosphate in 200 millilitres of physiological saline, papaverine was given as a slow intra-arterial injection of 40 to 60 milligrammes dissolved in 10 millilitres of physiological saline; in each case the infusion or injection was repeated weekly for a period of three months. "Ronicol" was given orally in a dose of 25 milligrammes three times a day for a period of several weeks.

and information concerning mode of death indicated that death was due to cardiac disease (usually coronary occlusion or insufficiency) in seven, a cerebral vascular accident in two, and "pneumonia" in one.

The total known duration of claudication in the 51 cases is given in Table V. This shows that half the patients had survived for more than five years from the onset of their claudication, and four-fifths for more than two years. (The final survival period will, of course, be longer because most of the patients are still alive.)

TABLE III.
Change in Test Performance Following Treatment.

Treatment.	Step Test Performance Significantly ^a			Total.
	Im- proved.	Un- changed.	Worse.	
Placebo	7	7	1	15
Intraarterial administration of vasodilators (histamine, papaverine)	2	5	0	7
Intramuscular administration of heparin	5	5	1	11
Oral administration of "Ronicol"	2	8	1	11

^a Significant change in step test performance is taken as one of 20% of the original performance.

Development of Clinical Atherosclerosis Elsewhere.

In addition to the nine patients with clinical atherosclerosis elsewhere at presentation, this feature developed in a further 11 patients, so that the final incidence was 20 in the 42 patients available for the study (the 41 in relation to whom information was obtained by questionnaire, and one who developed symptoms before he ceased attending the clinic). Of the 20 patients, the disease affected the cerebral vessels in six and the coronary vessels in 14. (These figures include the patients who died of complications of their atherosclerosis.)

Progress of Occlusive Arterial Disease in the Legs: Claudication.

Since no worthwhile deduction concerning the progress of claudication could be made in relation to the patients who were lost from supervision or who died shortly after presentation, the progress of this symptom—judged from the patients' records and/or answer to the questionnaire—has been assessed only in relation to those followed for at least one year from presentation. Three of these have been excluded because in one case the patient's walking distance was limited by the pain of *angina pectoris* and in two arterial grafting was performed. Of the 36 patients who remained for study, the walking distance of nine increased, that of 17 remained the same, and that of 10 decreased. Claudication pain became bilateral in six of 24 patients in whom the symptom was unilateral when they were first examined and who were followed for more than one year.

In addition to the three patients with gangrene on presentation, a further six subsequently developed severe distal ischaemia (gangrene in five, severe rest pain in one), an overall incidence of gangrene or incipient gangrene of between 20% and 25%. Of the nine patients, seven had suffered from claudication for more than five years and the other two for more than two years. Two above-knee amputations and two local amputations were performed.

Effect of Treatment.

Some of the patients received one or more of the "treatments" mentioned in the first part of this paper, none of which produced striking benefit. Lumbar sympathectomy was performed on 19 patients, without any striking effect on the walking distance (six patients believed that their subsequent walking distance was the same, five that it had increased and five that it had decreased; in three the

response could not be discovered). Two patients were treated by arterial grafting. In one the graft thrombosed and the patient's claudication returned. In the other, a man with claudication and gangrene of a toe, there was a block in the external iliac artery and also in the superficial femoral artery. The iliac artery was grafted; the gangrenous tissue separated and the leg was saved, although claudication persisted.

TABLE IV.
Basic Data on 51 Patients in Follow-up Study.¹
Table IVA.—Age and Sex Incidence.

Age (Years).	Male Patients.	Female Patients.	Total.*
30+	2	1	3
40+	5	2	7
50+	14	—	14
60+	18	2	20
70+	6	—	6
80+	1	—	1
Total	46	5	51

Table IVb: Diagnosis.

Diagnosis.	Number of Cases.
Atherosclerosis obliterans	45
Thromboangiitis obliterans	3
Aortic thrombosis	1
Traumatic thrombosis	1
Narrowing of vessels of unknown cause	1

Table IVc: Duration of Claudication.

Duration.	Number of Cases.
Under 6 months	15
6 months+	8
1 year+	6
2 years+	5
3 years+	17

¹ The claudication was unilateral in 28 cases and bilateral in 23. Distal ischaemic features were present in 26 cases (including ischaemic necrosis in three) and absent in 25. Clinical evidence of atheroma elsewhere was present in nine cases (three cerebral, six cardiac) and absent in 42.

Discussion.

Variability.

Attention has been drawn previously (Barnett, 1954; Newman and Barnett, 1955) to the wide variations which may occur in a patient's assessment of his walking distance, making this unsuitable as an index of response to therapy. Also, isolated step tests, even when performed by trained persons, are of little use, because the range even on one day may be several hundred per centum and it is necessary to take the mean of the results of several tests. Although initially some patients show moderate or pronounced variability (with standard deviation more than 20% of the mean), after three months' training they all show low variability (standard deviation less than 20% of the mean). The estimation of a mean of 12 step tests in subjects who have been trained for three months would therefore seem to be a reasonable basis for assessing progress.

Course of the Symptom.

Although one or more treatments were used on most of the patients, none gave results, judged from ability to produce significant clinical improvement, better than those produced by the deliberate use of a placebo; in fact, in most cases they were useless. It is therefore justifiable to consider that the change in performance was due to the

natural course of the disease without treatment or with only placebo treatment. In general, the patients (as observed by the step test) showed no change or improved. As might be expected, improvement was more frequent in those who had a short history, indicating a recent occlusion, than in those with a long history. When judged from the patient's assessment over a longer period (two to five years) obtained from the questionnaire, the commonest finding was again "no change", although some had improved and some had become worse. Claudication is therefore not a condition requiring urgent treatment; on the other hand, it is not likely to disappear. The major factor influencing treatment will be the disturbance it is causing to the patient's way of life.

TABLE V.
Total Duration of Claudication (Until End of Survey) in 51 Patients.

Duration of Claudication.	Patients.			Totals.
	Now Dead.	Now Living.	Present State Unknown.	
Under 6 months	—	—	4	4
6 months+	1	—	1	2
1 year+	1	—	2	3
2 years+	—	9	1	10
3 years+	—	4	—	4
4 years+	1	2	—	3
5 years+	7	16	2	25

Development of Other Ischaemic Features.

The infrequency of development of other ischaemic features in the claudicating limb or other ischaemic features in the other limb is remarkable. Only two patients in the whole series required major amputation because of ischaemic necrosis.

As has been pointed out in another paper (Barnett and St. Clair, 1956), about 20% of patients with claudication have evidence of ischaemic disease elsewhere when first examined. In the group followed for two years or more from the time of presentation the proportion had risen to about 50%. However, some 50% of the patients studied in this report survived for more than five years, and 80% for more than two years.

Outlook for Patients with Intermittent Claudication.

Although the findings emphasize that patients with claudication are usually suffering from a generalized disease and are liable to its complications, they also indicate that the outlook is rather brighter than might be expected from this fact.

They are usually in no immediate danger of losing either their limbs from gangrene or their lives from a cerebral or cardiac catastrophe. The claudication is likely to remain much the same over a period of a few years, although in some cases it may grow a little worse, in others better.

What has treatment to offer? Hamilton and Wilson (1952) investigated various treatments in favour at the time of their study and found none to be of value. We have previously investigated the value of sympathectomy (Barnett, 1954) in this condition and found it to be useless. In this paper we have mentioned various other measures, none of which were found to produce clinical improvement. These have included the oral administration of a vasodilator drug, vasodilator drugs injected into the femoral artery, and an anticoagulant drug, heparin. Since none of the vasodilator measures has proved of value, it would seem unprofitable to investigate others. In fact, the use of these procedures seems theoretically wrong. Probably none of the measures is more potent as a dilator of muscle vessels than muscular exercise itself. A previous study (Barnett and St. Clair, 1956) has shown that in most cases there is a block of a proximal large artery, and the only treatment likely to increase the exercise blood flow of muscle is to restore the main channel or perhaps

promote the growth of large collateral vessels. Since the extent of the collateral circulation probably depends on the pressures above and below the block (Longland, 1953), we have not much control over this factor. The treatment of intermittent claudication would therefore seem to lie in the prevention of atheroma, surgical measures to bypass a developed block, or symptomatic measures to reduce the work of the muscles in which the pain arises.

Summary.

1. The natural history of intermittent claudication has been studied by (a) following the patient's performance with a standard step test (23 patients), and (b) analysis of clinical notes and replies to a questionnaire relating to patients examined more than two years ago (51 patients).

2. Although there was a marked range in the step test performance, the variability as assessed by the standard deviation was reasonably small when calculated on 12 tests within four weeks after "training" for three months.

3. None of the various treatments used (heparin given intramuscularly, the intraarterial injection of vasodilator drugs, the oral administration of "Ronicol") was superior to a deliberate placebo treatment. The course of the symptom in the patients observed can therefore be taken as due to its natural history (*plus placebo*). The tendency of the symptom, studied by step tests for over twelve months, was to remain the same or to decrease.

4. The clinical study (over an observation period of two to five years) showed that in about half the patients the severity of claudication remained unchanged; of the remainder, in about half it decreased and in half it became worse.

5. Only two of the patients studied required major amputation.

6. The incidence of clinical atherosclerotic disease in heart and brain was high; about 50% of the patients were affected at the end of a period of observation of two to five years.

7. The survival period from the onset of the symptom was over five years in 50% of the patients and over two years in 80% (many of the patients are still living).

8. The outlook for patients with intermittent claudication and the indications for treatment are considered in the light of these findings. The following conclusions are reached: (a) The treatment of intermittent claudication is not an urgent matter, its main indication being the interference with the patient's way of life. (b) The treatments previously adopted (vasodilator drugs, sympathectomy) are of no value; apart from symptomatic measures to reduce the work of "claudicating" muscles, the only logical treatment is to increase the blood flow by vascular grafting (if arteriograms show this to be feasible). (c) The incidence of development of ischaemic features elsewhere, although high, does not preclude operation.

Acknowledgements.

Our thanks are due to Dr. T. E. Lowe, Director of the Baker Medical Research Institute and the Clinical Research Unit, Alfred Hospital, for encouragement in this work. Dr. H. C. Newman and Dr. A. St. Clair were responsible for recording many of the step tests; the results of which are analysed in this report.

References.

- BARNETT, A. J. (1954), "Lumbar Sympathectomy for Occlusive Arterial Disease", *Australasian Ann. Med.*, 3: 295.
- BARNETT, A. J., and ST. CLAIR, A. (1956), "Intermittent Claudication: I. Clinical Aspects", *M. J. AUSTRALIA*, 2: 736.
- BOYD, A. M., RATOLIFFE, A. H., JEPSON, R. D., and JAMES, G. W. H. (1949), "Intermittent Claudication: A Clinical Study", *J. Bone & Joint Surg.*, 31B: 325.
- HAMILTON, M., and WILSON, G. M. (1952), "The Treatment of Intermittent Claudication", *Quart. J. Med.*, N.S., 21: 169.
- LONGLAND, C. J. (1953), "The Collateral Circulation of the Limb", *Ann. Roy. Coll. Surg. England*, 13: 161.
- NEWMAN, H. C., and BARNETT, A. J. (1955), "A Comparison of Placebo and Heparin Treatment in Intermittent Claudication", *Australasian Ann. Med.*, 4: 195.
- SHEPHERD, J. T. (1950), "Evaluation of Treatment in Intermittent Claudication", *Brit. M. J.*, 2: 1413.

Reviews.

Handbook of Poisons. By Robert H. Dreisbach, M.D., Ph.D.; 1955. California: Lange Medical Publications. 7" x 4", pp. 433. Price: \$3.00.

The instructions given in this handbook on the general principles of treatment and then the specific antidotes for the various agricultural, industrial, household and medicinal poisons, are all very clearly and practically enumerated. However, the generalization "Mussels, clams and oysters growing on the open ocean, become poisonous during the warm months (May to September) from feeding on certain dinoflagellates, including *Gonyaulax catenella*", is surely not to be accepted generally, even though it be true in certain localities. This statement does not even abide by the old boggy of months with "R" in them. A further sweeping claim is made for the curative power of tiger snake antivenene, which is stated to be used against all Australian tiger snakes, including the melanotic and insular varieties, the Australian copperhead, the death adder, the taipan, the red bellied black snake, the mulga snake, the Papuan "black" snake, the broadheaded snake and the common brown snake. The Commonwealth Serum Laboratories handbook is probably the basis for this broad statement, for it advises that tiger snake antivenene should be used for the bite of any venomous Australian snake for two reasons—firstly, as the snake frequently is not identified, and secondly, as the amount of venom injected is not known. Tiger snake antivenene gives some degree of cross-protection against venoms other than that of tiger snakes, and therefore liberal doses should always be used, for in this way a fatal outcome may possibly be avoided, even though there is no proof that the bite could have been a fatal one. Specific known antisera for venomous snakes from all parts of the civilized world are also listed.

In addition to the details of remedies for poisoning, 53 pages are devoted to well-illustrated descriptions of modern resuscitation apparatus and full instructions are given for their use, so that collapsed or comatose patients can be revived while receiving specific antidote treatment when the cause is known. A compact handbook such as this is most useful for all doctors, and the book is well written and at all times most practical.

The Surgery of Childhood for Nurses. By Raymond Farrow, M.A., B.M., B.Ch. (Oxon.), F.R.C.S. (Eng.); 1956. Edinburgh and London: E. and S. Livingstone, Limited. 8½" x 5½", pp. 321, with illustrations. Price: 25s.

ALTHOUGH there are several excellent text-books on general surgical nursing, there is room for one devoted to surgical nursing in childhood. This book sets out to fill this gap. It would appear to be based on the author's lecture notes while he was tutor to nurses at Westminster Children's Hospital, London. The book is a credit to the publishers and no criticism is directed at its general layout or its excellent illustrations.

However, we cannot recommend this book to student nurses, or to tutor sisters, because there are many statements regarding operative treatment and pre-operative and post-operative management which do not appear to conform to modern surgical knowledge or practice in the field of pediatric surgery. The impression one obtains is that the author's notes were already several years out of date and have been only partly modernized.

A Short Practice of Surgery. By Hamilton Bailey, F.R.C.S. (Eng.), F.A.C.S., F.R.C.S., and R. J. McNeill Love, M.S. (Lond.), F.R.C.S. (Eng.), F.A.C.S., F.I.C.S., with chapters by John Charnley, F.R.C.S. (Eng.), William P. Cleland, M.R.C.P. (Lond.), F.R.C.S. (Eng.), and Geoffrey Knight, F.R.C.S. (Eng.), with pathological illustrations by L. C. D. Hermite, M.B., Ch.B. (Edin.); Tenth Edition; 1956. London: H. K. Lewis and Company, Limited. 9½" x 7", pp. 1134, with 1411 illustrations. Price: £4 4s.

The tenth edition of this book is a great achievement. One of its authors has noted previously what an infinitesimal proportion of books survive even twenty years, but this favourite text-book of students, after a much longer life, goes from strength to strength.

While the subject matter in the earlier editions was rather skimpy, suggesting a book for the pass student, a vast mass of information is now presented, in varying type sizes, so that even the candidate for higher surgical degrees will find all that he needs within its pages.

While the original authors are still responsible for the greater part of the book, chapters on orthopaedic, chest and neurological surgery have been contributed by Charnley, Cleland and Knight respectively.

Many aspects of the work are quite charming. It is printed clearly on glossy paper within strong covers, and its shape corresponds well with its size. More than 1400 small illustrations, many of them reproductions of colour photographs, give a visual appreciation of the subject matter, while tabulations of symptoms and various diagrammatic aids are employed wherever practicable.

Whenever a name is mentioned in the text, a biographical note is appended in small type at the foot of the page; while a ribbon marker is a reminder of its primary object as a student's text-book.

Every aspect of general surgery receives consideration. The particular interests of the authors are sometimes evident, as in the chapters on the thyroid gland, pancreas and genito-urinary tract, by an unusually full and authoritative presentation of these subjects.

In contradistinction, certain other chapters, such as those on the gall-bladder and bile ducts, and the stomach and duodenum, are disappointing. Here, as elsewhere in the book, the common English weakness of presenting lists of symptoms, without any explanation of their mechanism of production, is very evident. This is a fundamental defect in teaching, which denies students the fascinating art of deducing from the pathological condition the symptoms to which it must give rise.

The newer fields of surgery receive very adequate attention, and as an example, the chapter on the heart embodies information which has become available only in the last three years.

It can be stated without qualification that this edition of Bailey and Love is a magnificent achievement, providing a text-book that will supply both student and practitioner with a vast mass of accurate information, presented in a most effective and pleasing manner. The book well deserves its position as one of the leading text-books of surgery in the English language.

An Introduction to Electrocardiography. By L. Schamroth, M.B., B.Ch. (Rand), M.R.C.P.E., F.R.F.P.S.; 1956. Cape Town and Johannesburg: Juta and Company, Limited. 9½" x 6", pp. 72, with illustrations. Price: 21s.

In this book Dr. Schamroth has endeavoured to present in simple form the essential electro-physiological principles on which electrocardiography is based, and by means of numerous diagrams to depict and explain the common abnormalities. It is written to assist the student and general practitioner with the problem of clinical medicine. As is the case with most books of this type, much has of necessity been omitted and many statements are rather too bald. This can lead to confusion of thought, and such appears to be the case in the portion devoted to the electrical axis, where one is given the impression that the anatomical position of the heart corresponds with the electrical axis. The author fails to clarify the point. The description of the changes in angina as compared with infarction tends to be over-simplified, but perhaps serves its purpose. The statement that atropine has no effect on partial heart block is obviously too sweeping.

Taken as a whole, this book is quite a useful one for those for whom it was written, but probably its greatest value is for those who have studied under Dr. Schamroth.

Obstetrical Practice. By Harold Speert, M.D., and Alan F. Guttmacher, M.D.; 1956. New York: Landsberger Medical Books, Incorporated. 8" x 5½", pp. 478. Price: \$7.00.

This book has been "specifically designed to meet the needs of the general practitioner". The authors have aimed at producing "a practical, up-to-date guide . . . with more than the usual attention given to the many details of practical clinical problems and their management". It is assumed that the reader possesses "familiarity with the basic problems and techniques of obstetrics". Illustrations, bibliography and theoretical discussions have been deliberately omitted.

The style is refreshing, and the material is certainly for the most part up to date, and has obviously not been merely transcribed from a standard text. Yet the book cannot unreservedly be recommended to the Australian general practitioner. A general view of modern American obstetric

teaching can be gained from it, but it will often disappoint anyone seeking detailed guidance in the management of a specific difficulty. No answer will be found to many important questions which will crop up in the management of the pregnant patient with poliomyelitis or infectious hepatitis. "Problems in labour" are dealt with far too broadly. No mention is made of folic acid in the management of the megaloblastic anemia of pregnancy. "Response to liver and vitamin B₁₂ is poor." The treatment recommended is blood transfusion. Post-maturity, which is defined as gestation continuing two weeks or more beyond the estimated date of confinement, is dismissed in a few lines, with the conclusion that it is not in itself an indication for induction of labour.

While much useful information may be gleaned from the book, the general practitioner faced with a really worrying case will often find scant comfort from recourse to the pages of "Obstetric Practice".

Practical Section Cutting and Staining. By E. C. Clayden. F.I.M.L.T.; Third Edition, 1955. London: J. and A. Churchill, Limited. 8" x 5½", pp. 160, with 26 illustrations. Price: 12s. 6d.

THE appearance of three editions of "Practical Section Cutting and Staining", by E. C. Clayden, senior technician in the Morbid Histology Department of the Bland-Sutton Institute of Pathology, the Middlesex Hospital, London, proves that this little book is a useful and popular one. It is written for technicians in training and the directions given are clear, simple, detailed and precise. This is high praise for a book on the preparation of tissue sections, for it is a technique—in the hands of the expert it is an art—which requires infinite care, meticulous precision and great patience, if perfect sections are to be produced from every block. According to the preface to the third edition, this book has been written essentially on basic techniques which have all been proved to give consistent and reliable results. Only one method for most techniques is described; this is a laboratory manual rather than a book of reference. Descriptions of several modern staining methods have been added in this edition. The Cambridge rocker is described, as in previous editions, but there is a more detailed description of the rotary microtome than before and a page or two is devoted to automatic tissue processors such as the "Auto-technicon". One feels, however, that the author, a first-class craftsman himself, would back craftsmanship against automation any day in the week. This honest, reliable and unpretentious manual deserves a place in every laboratory.

Principles of Human Physiology (originally written by E. H. Starling, M.D., F.R.C.P., C.M.G., F.R.S.); Twelfth Edition, 1956. By Sir Charles Lovatt Evans, D.Sc., F.R.C.P., F.R.S., LL.D., with chapters on the special senses by H. Hartridge, M.A., M.D., Sc.D., F.R.S. London: J. and A. Churchill, Limited. 9½" x 6½", pp. 1245, with numerous illustrations. Price: 65s.

SINCE this book was first written by Professor E. H. Starling in 1912, it has remained a classical text for all those interested in the study of human physiology. This is the twelfth edition and the eighth since Sir Charles Lovatt Evans took over in 1928. Although Sir Charles has retired from the Chair of Physiology at University College, he is still active in the laboratory, and this edition shows not only his great energy and industry, but his tremendous breadth of knowledge and experience; he belongs to a race of physiologists that in this age of specialization is almost extinct. As he points out in the preface, the advances in physiology during the past thirty years have been greater than in the preceding one or even two centuries, not so much by the introduction of entirely new points of view as by exhaustive exploration, by precise methods, of what were previously mere indications in an uncharted forest. The fact that once again the whole book (except the chapters on special senses, which have again been written by Professor H. Hartridge) has been written by the author himself, gives to the reader an unfolding account of physiology as viewed by one man who has devoted a lifetime to research and teaching.

As previously, this edition consists of eight sections: "General Principles" (including structural principles, biochemical principles and biophysical principles); "Tissues Sub-serving Movement and Conduction"—muscle and nerve; "Centralized Control and Co-ordination"—the central nervous system; "The Supplying of Information"—the special senses; "Systems for Distribution of Materials"—blood, circulation and respiration; "The Intake of Materials"—nutrition and metabolism; "The Removal of Waste Material and Temperature Conservation"—excretion and temperature regulation;

"The Provision of Special Chemical Stimulants, and of Measures for Continuance of the Species"—the endocrine organs and reproduction. It presents a relatively compact account of our present knowledge of human physiology and of cognate parts of biochemistry, and it should be used by all students of medicine and science. It is not a dull accumulation of facts; the author gives a continuous account from the classical researches of the past to those of the present day, by which our concepts of the functioning of the human body have gradually been moulded, and no one is more qualified to do this than Sir Charles Lovatt Evans.

There are a great number of references; those at the foot of each page are to individual papers which will help the reader to follow up a point, while those at the end of sections are mainly to review articles. These references make the book an invaluable guide to the medical graduate or to the research worker who wishes to delve more deeply into the original experiments on which our principles of physiology are based.

The Royal Melbourne Hospital Medical Manual. Editorial Committee: Geoffrey A. Penington, M.D., B.S., Melb., F.R.A.C.P., Kenneth J. Grice, M.D., B.S., Melb., M.R.C.P., F.R.A.C.P., Patrick N. O'Donnell, M.D., B.S., Melb., M.R.A.C.P., Berta Ungar, M.D., B.S., Melb., Charles B. MacGibbon, Ph.C., F.P.S., Vic., and William R. Mackay, Ph.C., M.P.S. (G.B.), F.P.S., Vic.; Second Edition. 7" x 4½", pp. 342.

HOSPITALS in which there is a large annual turnover of resident medical officers have for long realized the saving of time and money, as well as the increased efficiency, provided by a hospital pharmacopoeia, a diet manual, and the dissemination of printed instructions concerning procedures in pathological, biochemical and radiological departments. A staff committee of the Royal Melbourne Hospital has recently completed the second edition of a manual which combines all this information in one booklet. This manual sets out an alphabetical list of drugs, some official, some unofficial, and then records the preparations, including named mixtures, currently available at that hospital. There are many cross-references; but some important hospital medicaments, such as phenylenedione, phenylbutazone, chlorpromazine *et cetera* appear to be left out. Sometimes warnings are inserted—for example, concerning the use of digitoxin and the intravenous administration of quinidine. A hospital pharmacopoeia should probably omit these substances altogether. Another criticism is that only rarely is there a hint as to the function of a drug.

The section on dermatology is followed by one devoted to the treatment of "industrial poisoning"; we think that household poisons should be included as well. Then follows a "potted" review of clinical pathology and biochemistry. This includes a good deal of scattered theoretical information better obtained from proper text-books. On the other hand, some new and useful techniques are wholly omitted. The best part of this section deals with tests for renal insufficiency.

Surely a short section on resuscitation, with the indications for the use of blood and blood substitutes and the biochemistry of "acute" medicine, deserves a place in a modern hospital manual, provided that it corrects the current attitude of students and young resident medical officers that the electrolyte pattern of the peripheral blood or fluids directly reflects the status of electrolyte stores of the patient.

This booklet of over 300 pages concludes with the standard instructions about preparations for various radiological procedures, and an excellent section on diet, wherein much-needed pruning has been practised. However, not everyone will agree that a "hepatitis diet" should always have a high protein content.

The manual probably fulfils its purpose most adequately at the Royal Melbourne Hospital. This type of companion is most difficult to compile, and we congratulate the editorial committee on its achievement.

Hydrocortisone in Orthopaedic Medicine. By James Cyriax, M.D., M.R.C.P.; 1956. London: Cassell and Company. 8½" x 5½", pp. 27. Price: 5s.

THIS short book is an amplification of a paper published in 1953 in the *British Medical Journal* entitled "Hydrocortisone and Soft Tissue Lesions". It is based largely on the author's experiences at his own clinic at St. Thomas's Hospital.

Too much has been attempted in a brief compass. The reader is left with a confused impression of theory and practical details.

We do not agree either with the uselessness of intra-articular injection of hydrocortisone in osteoarthritis, nor with its general superiority over systemic use of cortisone in rheumatoid arthritis. A useful purpose has been served, however, in drawing attention to the value of the local use of hydrocortisone in painful lesions of tendons, muscular insertions and fasciae.

The techniques are well described, but could in many instances have been made clearer by the use of suitable diagrams.

It is necessary for the reader to have a considerable background of knowledge of the techniques described in order to profit fully from perusal of this book.

A Primer of Electrocardiography. By George E. Burch, M.D., F.A.C.P., and Travis Winsor, M.D., F.A.C.P.; Third Edition; 1955. Philadelphia: Lea and Febiger. Sydney: Angus and Robertson, Limited. 9" x 6", pp. 286, with 281 illustrations.

In its second edition, this book will continue to be of outstanding value as an introduction to electrocardiography. Its clear and concise style has already won for it a world-wide reputation. The illustrations, of which there are many excellent stylized diagrams, constitute a major feature of the work. There are few pages on which they do not appear, making reading interesting and easy.

In the ten years which have elapsed since the first edition appeared, many new concepts have entered into the subject of electrocardiography. The authors have critically analysed their value, and in bringing this edition up to date a wise admixture of new and old has been created. The fundamentals of vectorcardiography are given, but not sufficient to dominate the book. The concept of the ventricular gradient is also explained and its possible value elaborated.

This book can be recommended to students, graduates and specialists alike, all of whom it must impress as a clear, concise and useful account of this important subject.

Elements of Healthful Living. By Harold S. Diehl, M.A., M.D., Sc.D.; Third Edition; 1955. New York, Toronto, London: McGraw-Hill Book Company, Incorporated. 9" x 6", pp. 368, with illustrations.

"ELEMENTS OF HEALTHFUL LIVING" was written largely to fulfil the concept of the "American Council of Education", according to the preface of the third edition, which now appears, namely, "that a more definite and consistent program for physical fitness should be developed and required of all students" and that these "Potential leaders . . . should be not only physically fit but also be thoroughly informed on matters of personal health and hygiene". It is certainly a most worthwhile contribution to public health literature, and has chapters upon all topics that can be associated with the title. Thus some of these include mental health, the choice of foods, stimulants and narcotics, sex life, and care of the nose, throat, ears and teeth, to mention several. The pros and cons of smoking are discussed fully, as are the problems associated with alcohol. Other public health problems, such as the common cold, tuberculosis, and health problems of advancing years, are all fully dealt with, and in regard to the common cold, druggists are not spared for capitalizing this disease into "a million dollar sneeze".

The chapters on sex life and modern parenthood deal with these subjects very frankly, and student readers could be well guided by the advice given. "Choosing a Health Adviser" is another heading, and here the reader is told what to expect in his physician, and is advised to consult him regularly to ensure good health. The concluding chapter deals with "Community Health", and includes topics from drinking water to the problems of health in industry. As can be seen from the foregoing subjects mentioned, the book covers a wide range in its 357 pages, and could be profitably read by all nurses and students of tertiary education as well as by their instructors.

The Office Assistant: In Medical or Dental Practice. By Portia M. Frederick and Carol Towner; 1956. Philadelphia and London: W. B. Saunders Company. Melbourne: W. Ramsay (Surgical), Limited. 8" x 5½", pp. 358, with illustrations. Price: 47s. 6d.

UNITED STATES FIGURES show that of doctors and dentists who employ an office assistant, 65% have only one, and therefore it is advantageous for such assistants to be a combination of secretary and nurse. The preface of this book states that "she may be receptionist, secretary, book-keeper and technician, as well as medical or dental assistant",

and the aims of this book are to help train girls in both the secretarial and medical or dental aspects of their work. On the secretarial side very complete instructions are given on all topics from the technique of answering the telephone and keeping records to banking and book-keeping. However, on the nursing side, while the teaching is very well laid down, many doctors would not perhaps wish an untrained nurse to undertake all the duties the book envisages. Thus, very full details are given on injection technique, even down to how to give a fractional dose of a hypodermic tablet. Care of instruments and apparatus, posturing of patients for various examinations, and methods of sterilization are other subjects included, and a very practical chapter is just headed housekeeping. Some of the subject matter mentioned, such as details of accident and health insurance, are different from the health schemes found in this country. This book will play a useful part in training girls, and it is one that all doctors and dentists could profitably invest in to have on hand for each new assistant to read, be she nurse or secretary.

Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]

"Fellowship Examination Papers for the Diplomas of the Royal College of Surgeons, Edinburgh, 1951-1956"; 1956. Edinburgh and London: E. and S. Livingstone, Limited. 7" x 5", pp. 60. Price: 5s. 6d.

This is likely to be of use to those preparing for a higher surgical degree or diploma.

"Clinical Hematology", by Maxwell N. Wintrobe, M.D., Ph.D.; Fourth Edition, 1956. Philadelphia: Lea and Febiger. Sydney: Angus and Robertson, Limited. 9½" x 6", pp. 1186, with 236 illustrations and 20 plates, 18 in colour. Price: £8 5s.

The first edition was published in 1942 and the third in 1951.

"Psychopathy and Delinquency", by William McCord, Ph.D., and Joan McCord, Ed.M.; 1956. New York and London: Grune and Stratton. 8½" x 5½", pp. 240. Price: \$6.50.

One of the main purposes of this book is to record the results of "milieu therapy" as practised at the Wiltwyck School.

"Medical Physiology", edited by Phillip Bard; Tenth Edition; 1956. St. Louis: C. V. Mosby Company. Melbourne: W. Ramsay (Surgical), Limited. 10" x 7", pp. 1446, with 438 illustrations. Price: £7 14s.

This is another edition of what used to be known as "Physiology and Biochemistry in Modern Medicine" by J. J. R. Macleod.

"Techniques and Procedures of Anesthesia", by John Adriani, M.D.; Second Edition; 1956. Oxford: Blackwell Scientific Publications. 10½" x 6½", pp. 582, with illustrations. Price: 66s.

The techniques described in this book are those which illustrate fundamental principles and which the author has found adaptable for student personnel.

"Disease in Infancy and Childhood", by Richard W. B. Ellis, O.B.E., M.A., M.D., F.R.C.P.; Second Edition; 1956. Edinburgh and London: E. and S. Livingstone, Limited. 6" x 10", pp. 717, with 233 illustrations. Price: 60s.

The first edition appeared in 1951.

"Essential Urology", by Fletcher H. Colby, M.D. Third Edition; 1956. Baltimore: The Williams and Wilkins Company. Sydney: Angus and Robertson, Limited. 9½" x 6½", pp. 666, with illustrations. Price: 88s.

The first edition was published in 1950.

"Postural Drainage", by E. Winifred Thacker; 1956. London: Lloyd-Luke (Medical Books), Limited. 7½" x 4½", pp. 64, with illustrations. Price: 8s. 6d.

Illustrates the technique of postural drainage.

The Medical Journal of Australia

SATURDAY, NOVEMBER 24, 1956.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given: surname of author, initials of author, year, full title of article, name of journal, volume, number of first page of the article. The abbreviations used for the titles of journals are those adopted by the Quarterly Cumulative Index Medicus. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

EMIL KRAEPELIN.

With all the attention which is being given to the centenary of Freud's birth a distinguished contemporary psychiatrist seems likely to be overlooked. Emil Kraepelin was born in 1856, and while at the university became under the influence of the psychologist Wundt interested in the study of mind. After graduating in medicine Kraepelin engaged in research on the effect of fatigue and toxic agents, including alcohol, on the mental functions, and aimed at demonstrating specific effects on certain regions of the brain, a line of investigation which is being repeated today with the hallucinogenic drugs. He was appointed a professor of psychiatry at the early age of thirty, and in 1904 became Professor and Director of the Psychiatric Clinic at Munich, which came to be regarded as a model university psychiatric hospital. In 1922 Kraepelin gave up these appointments in order to work for the establishment of a German Institute for Psychiatric Research, an object which he attained some years later in spite of his antagonism to the Nazi regime. The first edition of his great text-book appeared in 1882, and he was preparing a tenth edition when he died on October 7, 1926. Kraepelin worked to put psychiatry on a sounder basis by careful and critical observation of symptoms and signs, history and course, not neglecting pathology. Unlike Freud, he engaged in no speculation as to motivation and mental dynamics. In one of his papers he wrote: "This hasty connecting of one impressive incident with another is largely responsible for the terrible confusion in the teaching of causes in psychiatry as in other departments of

medicine." Kraepelin's great contribution to psychiatry was the definition of psychoses without physical aetiology or structural pathology, one group largely progressive (*dementia praecox*, paraphrenia and paranoia), the other periodic with relative normality in between attacks (manic-depressive psychosis). Involuntary melancholia or *melancholia vera* was described as a separate entity.

In this systematization of psychiatry, Kraepelin classified and grouped syndromes which had been described separately by other workers and so laid the foundations for more orderly and scientific diagnoses. That he tended to subdivide and over-elaborate his classification does not detract from the impact which he made on psychiatry. His text-book in four volumes covered the whole range of mental disorders, though the emphasis was on institutional cases, and with the exception of psychopathic states he has less to say about non-psychotic conditions than would be expected in the text-books of today. Another research which continued to be a dominant interest up to his death was the study of the effect of cultural conditions on the symptomatology and course of mental disorders, particularly general paresis and *dementia praecox*, for which purpose he had travelled through India and the East Indies. He sought to determine to what extent civilization promotes degeneracy or forward development amongst primitive peoples. Much of the current study by anthropologists and psychiatrists of social and cultural influences on mental disorders rests on foundations laid by Kraepelin.

SECOND WORLD CONFERENCE ON MEDICAL EDUCATION.

The Second World Conference on Medical Education is to be held in Chicago, Illinois, United States of America, from August 30 to September 4, 1959. The theme is to be "Medicine—Life-Long Study", and the conference will concern itself with "the continuing education of the doctor after graduation from undergraduate medical schools". The broad objective of the conference is stated to be the "exchange of information for the purpose of assisting in raising the standards of medical education of the world". Some of the principal office-bearers have already been named, including the President, Dr. Raymond B. Allen, who is Chancellor of the University of California in Los Angeles, and the Deputy President, Dr. Victor Johnson, who is Director of the Mayo Foundation for Medical Education and Research at the University of Minnesota Graduate School.

The first day of the conference is set aside for a plenary session. In this the First Conference on Medical Education, which was held in London in 1953 (see *THE MEDICAL JOURNAL OF AUSTRALIA*, February 21, 1953), will be reviewed, and the two conferences will be tied together. Then the conference will divide for four sectional meetings devoted respectively to basic clinical training for all doctors, advanced clinical training for general and specialty practice, training for research and teaching, and continuing medical education. A plenary session will occupy the last day.

This conference is being sponsored by the World Medical Association with the collaboration of the World Health

Organization and the International Association of Universities. National medical associations and medical schools throughout the world are invited to assist in the following ways: in planning the conference; in recommending topics and well-qualified speakers to participate; in sending representatives; in providing suitable publicity. It is to be hoped that for this second conference the difficulties will be overcome which prevented Australia from being adequately represented at the first conference.

Current Comment.

AN OPHTHALMIC SURVEY.

WHILE the statistics relating to notifiable diseases are frequently correlated into conclusions to cover large sections of a community, it is very unusual to find an actual survey undertaken to assess the condition of the whole population of a large area. However, an ophthalmic survey of the south-west portion of Western Australia has been undertaken and reported by Professor Ida Mann¹ on behalf of the Public Health Department of Western Australia. The area covered was not the easiest to survey for health matters, even in this country. As a matter of fact the prodigious amount of work undertaken and the extensive nature of the exceedingly informative final report reveal considerable enterprise; the report must be a valuable contribution to the sciences of ophthalmology, epidemiology and preventive medicine. The survey was first initiated after the finding of a high degree of trachoma in the Kimberley district, and the work was primarily undertaken with a view to the investigation of the problem of trachoma in this part of Australia. The climate in the whole area is temperate and the aboriginal population decreases from north to south. Mann first reviews the racial and social characteristics of the different parts of the region, together with the educational and medical facilities available. Historically it seems likely that trachoma was introduced into Western Australia by the settlement of Europeans and by the importation of Chinese and Indian labour. The scope of the survey was limited by the degrees of cooperation of the residents of each area, and attention was particularly paid to children and adolescents, to the inmates of missions and schools, to institutions for migrants, and to native camps. The survey did not include metropolitan schools. In this south-western survey there were examined for signs of abnormalities of the eye, 3678 white people, 1793 coloured people, and 107 aborigines. Altogether 1287 cases of trachoma were discovered, but it was noted that by comparison with previous surveys in the goldfields and Kimberleys the severity of the disease decreases towards the south, probably because of improved standards of hygiene and living conditions in these areas. Despite the reduction in severity, the incidence of the disease was highest in coloured and aboriginal persons in the south-west, though the incidence was relatively low in the white population of these areas. Most of the cases produced little or no reaction, there was little secondary infection, and though some infected white children complained of irritation, the disease was not usually apparent until the eyelids were everted. Most endemic trachoma is acquired early in life, though the disease does not usually become serious for some years. It was obvious that there were three routes of infection: the first by immigration of infected white children from northern to southern schools, the second by the attendance at local schools of native children from camps, and the third by the segregation of native children in missions and hostels without due care in the admission of those from heavily infected areas. The incidence of other ocular abnormalities discovered by this survey was low and most

of these had already been satisfactorily treated. An interesting point was the finding of six cases of vision affected by measles. Only one patient was discovered with binocular blindness attributable to trachoma. There was the expected high incidence of folliculitis in white children, but other severe local eye infections were rarely if ever encountered, though Mann suggests that the many cases of marginal blepharitis should have been treated more vigorously. The incidence of strabismus is high and is mostly confined to white children. Trachoma is the disease which presents the greatest problem. It has by no means died out and is still being spread by the movement of labour. In the south-west area the incidence of trachoma was 2.45% in the white population, and about 60% or more in the coloured and aboriginal peoples. These latter form a reservoir for its possible spread to white school children. The trachoma found is usually mild in type because of the high standards of hygiene, which prevent the secondary infection and mechanical irritation of the primary epithelial virus infection. Flies, unhygienic habits, dirty clothing and bedding are factors in the spread of trachoma and in the occasional outbreaks of ophthalmia. Other eye diseases are of little or no moment, especially in native populations. With the completion of this survey, Mann suggests that attention should be paid to the institution of a mass trachoma campaign, considering the results of pilot treatment projects. Treatment must strike a balance between the ease of application and goodness of the result. With this in mind sulphadiazine or sulphadimidine given for fourteen days seems to be the most appropriate form of therapy. The problems of an anti-trachoma campaign are bound up with the reservoirs of infection and involve education as well as treatment. Frequent surveys by school medical officers and by travelling trachoma nurses are required. Schools with over 20% of infection should receive general "blanket" treatment, and thereafter all new white entrants from endemic areas, and all coloured and aboriginal entrants must be treated on arrival. Particular attention should also be paid to missions, which should be centres of treatment, rather than centres of dissemination as at present. The problem of epidemic purulent ophthalmia can be met by isolation of patients and the prophylactic and curative use of "Aureomycin" or "Terramycin" ointment. In the treatment of strabismus and marginal blepharitis in country children, one solution suggested by Mann is the establishment of a children's hostel so that these children can receive the facilities available for treatment in Perth.

MORTALITY AMONG THE MARRIED.

SEVERAL surveys, both British and American, have shown that married persons tend, on the whole, to live longer than those who are single, widowed or divorced. It has been suggested that, to the married, life only seems to be longer; however, some recent American mortality statistics have confirmed the relatively increased longevity of the married. D. Shurtleff² has explained some of the interesting conclusions which emerge from a study of the marital status of persons in the United States of America. For men, most marriages take place in the twenty-five to twenty-nine years age group, while women tend to marry rather younger. The eventual proportion of the unmarried of either sex is about 10%. In the middle age groups the divorce rate exceeds 3%. For every age group the death rates are lower in the married than in the single, widowed or divorced. The highest death rate is consistently in the divorced group. As might be expected, the male death rates are higher than those for the female in each related group; the difference is most apparent in the widowed and least apparent in the normally married. In other words the beneficial influence of marriage on the death rate bears particularly favourably upon the male.

There are, of course, several good reasons for some of the statistically increased longevity in the married persons.

¹"Ophthalmic Survey of the South-West Portion of Western Australia", William Wyatt, Government Printer, Perth, 1956.

²J. Am. Geriatrics Soc., July, 1956.

Shurtleff suggests that self-selection may play a part in the entering into marriage; selection also plays a part in remarriage—the divorced and widowed ailing are less likely to be accepted into a second marriage. The selection of the robust is demonstrated by the particularly high death rates in the unmarried young as opposed to the unmarried groups in later life. However, the differences in death rates do persist into later life, and this indicates that marriage itself may directly affect the mortality. In the opinion of Shurtleff, a family routine may be conducive to regularity in the patterns of sleeping, eating, working and playing. Family responsibility may call for moderation. Marriage has a stabilizing influence, particularly for the adventuresome male, who, when unmarried, is less limited by social and temperamental tendencies than the unmarried female. It would appear that with the increasing social acceptance of divorce, more married people are now able to find adjustment and satisfaction in the married state. For the widowed and divorced there is emotional and mental strain, and perhaps also a reduction in social and economic status. Study of the deaths by specific diseases reveals some surprising results according to the married status, and only the neoplastic conditions of the blood appear to affect the married and the unmarried alike. Tuberculosis, syphilis, influenza, pneumonia, hepatic cirrhosis, accidents, suicide and murder take their toll particularly in the unmarried. The importance of marriage in either preventing the disease or ensuring early treatment is revealed by the devastating effects of tuberculosis, pneumonia, influenza, syphilis and alcoholism in the divorced. Marriage reduces the death rates from accidents to half at all ages in the male. A similar reduction occurs in suicide in the male, though it is worthy of note that the suicide rate for the male is three to seven times that of the female, increasing with advancing age. As might be expected, the highest suicide rates are found in the divorced. An exception to the general rule lies in the slight advantage of single women in their susceptibility to homicidal attack. Disease of the heart is the chief cause of death in America, and at every age group the married are at an advantage over the single, widowed and divorced. Shurtleff suggests that this is attributable to the tranquillizing influences of married life. *Diabetes mellitus* is one of the few diseases which result in a higher mortality rate in the female and at the same time appear to affect the spinster considerably less than the married woman—this may be explained by circumstances conducive to overeating in the married female. To a limited extent the single woman seems to have an advantage over the married, and particularly over the divorced and widowed, in having a lower mortality from all the diseases which are enhanced by obesity.

CRASH HELMETS.

ALTHOUGH many young motor cyclists do not take kindly to the wearing of crash helmets, it is generally recognized that they have a high protective value, and air crew and racing motorists make extensive use of them. Much has been written and said on the subject by experts and enthusiasts, and a variety of helmets have been designed. However, the zeal displayed has not always been according to knowledge, and J. S. P. Rawlins¹ states that most present-day crash helmets are based not upon scientific theory but upon established lines which have resulted from misinterpretation of the mechanism of head injury. On the other hand, he goes on to point out that when the physics of head injury are studied, it is immediately clear that the theoretically sound helmet is neither difficult to design nor necessarily expensive to manufacture. This judgement on the present status of crash helmets will come as rather a surprise, but it must be treated with respect, since Rawlins, who writes from the Royal Air Force Institute of Aviation Medicine, bases his view on a review of the very considerable research that has been carried out

on the frequency, site and mechanism of head injury and on an examination of the fundamental requirements of crash helmet design in the light of experience gained in the development of the Mark I protective helmet now in general use in the flying services in Great Britain.

The importance of the subject is left in no doubt when we realize that an assessment made in 1943 of the frequency of head injuries in the Royal Air Force showed that 40% of all crash injuries were cranio-facial, and 20% of all fatalities were due to head injury. In 1953 a review of accidents in the United States Air Force showed that 24% of all major injuries were head injuries, and 14% of fatalities were due to head injury. An investigation of major injuries suffered by motor cyclists, reported in 1952, showed that more than 50% involved the head. Further examination of the figures for the United States Air Force and for the motor cyclists indicates that the wearing of a crash helmet reduces by roughly 40% both the proportion of fatalities due to head injury and the proportion of major head injuries. Rawlins quotes data relating to the sites of head injury taken from the Royal Air Force investigation in 1943 and from an inquiry by Cairns and Holbourn into the injuries of 96 motor cyclists. He draws the following interesting conclusions: (i) in all these activities head protection is an obvious requirement; (ii) the helmet should be designed to give maximal protection to the frontal area; (iii) protection must be adequate in the temporal region; (iv) occipital protection is necessary for air crew and racing motorists; (v) protection of the vertex in motor cyclists is of secondary importance. The other important requirement, if a crash helmet is to be designed in an efficient manner, is an understanding of the mechanics of injury of the brain and of fracture of the skull, either of which may occur without the other. From this the following seven requirements of the ideal crash helmet emerge: (i) protection against penetration and abrasion; (ii) protection against deformation of the skull; (iii) reduction of rotational acceleration; (iv) reduction of average linear deceleration; (v) reduction of peak linear deceleration; (vi) absorption of kinetic energy; (vii) distribution of impact. In addition, as Rawlins points out, the crash helmet must be as light as possible, comfortable, cool to wear and efficiently secured to the head. Translated into practical terms, the seven requirements listed will be largely met if the helmet has the following respective qualities: (i) it should be tough; (ii) it should be rigid, not elastic; (iii) its surface should be free from projections, to minimize torque; (iv) its surface should be smooth and have a low coefficient of friction, to facilitate sliding over the opposed surface; (v) by uniform deformation it should smooth out the acceleration curve; (vi) it should convert kinetic energy to energy of compression or extension; (vii) it should spread the blow as widely as possible over the head.

Rawlins points out that some of these properties are mutually incompatible, so that in practice the helmet can never be ideal. However, by regarding the helmet as being composed of two parts, an outer shell and an inner lining, something approaching the theoretical ideal can be imagined. The most suitable material for the shell yet tested at the Royal Aircraft Establishment is continuous-filament resin-bonded "Nylon". Under test conditions one shell made of this material has so far withstood, without obvious deterioration, 55 impacts from a ten-pound weight dropped from ten feet onto the crown. Such a shell will protect against penetration and deformation of the skull and will reduce rotational and average linear accelerations. The shell may be lined with a harness or with padding, or with a combination of the two. Rawlins states that the best padding material for the lining is probably expanded polystyrene, and the rigidity of the shell will spread a local impact over a wide area of the lining and hence of the head. Further distribution of impact can be obtained by using a lightweight harness or net, the sole object of which is to keep the head clear of the padding (incidentally permitting air-circulation thereby), but having a degree of stretch which will allow the head to "bottom" onto the shock-absorbing lining in the event of a heavy impact. "Nylon" tape is particularly suitable for this

¹ *Lancet*, October 6, 1956.

purpose. A practical difficulty with these materials is the fact that the technique of moulding "Nylon" is expensive and unsuitable for mass production by relatively unskilled labour. However, laminated fibre glass is very efficient and can be moulded in the cold. Another substance, "Durestos", has a poorer strength-weight ratio, but is still efficient and can be cast in concrete moulds. As regards the padding, expanded polyvinyl chloride has certain minor drawbacks, but is on the whole satisfactory, and it costs roughly one-third as much as sponge rubber, which is less efficient. Natural cork is also a satisfactory padding material and is roughly half the cost of sponge rubber.

No doubt in the construction of a helmet for use by air crew, the only consideration is that it should be efficient and convenient to wear; cost is much less important than it would be, for example, to the motor cyclist. Nevertheless, it is essential that the latter should have the benefit of modern knowledge on how his head may best be protected. It is encouraging therefore to find that Rawlins cannot resist the conclusion that efficient crash helmets could be put on the market at commercially satisfactory prices. It would then remain only to persuade the motor cyclists to wear them.

SYNTHETIC DETERGENTS.

In 1953 a committee was set up by the British Minister of Housing and Local Government "to examine and report on the effects of the increasing use of synthetic detergents and to make any recommendations that seem desirable with particular reference to the functioning of the public health services". The report of the committee has now been published,¹ and in view of the medical implications of many of its findings and the widespread use of detergents, it warrants careful consideration.

A detergent is defined by the Concise Oxford Dictionary as a cleansing agent, which would include soap. However, as the report points out, synthetic detergents are in practice commonly understood to mean "those soapless washing products that have recently come into wide use, particularly for domestic purposes". They do not form insoluble lime salts when used in hard water. They are made up of many different materials and combinations of materials, but nearly always consist of (a) surface-active materials (organic compounds having wetting, dispersing and emulsifying properties), together with (b) ancillary materials known as "builders", which in various ways make the compound products more suitable for their intended uses. The bulk of the synthetic detergents sold today are in the form of household washing powders, and these contain a greater weight of "builders" than of surface-active material. Since the second World War the amount of these synthetic detergents used has enormously increased, and they are now an accepted household commodity, especially for the washing of clothes and dishes. They are being employed to an increasing extent also in industry, with great advantage. Unfortunately they do not lack disadvantages, and it was these that the committee was particularly required to investigate.

The first question is whether synthetic detergents have any immediate ill effects on the domestic user. The report states that, when regularly used in contact with the skin, they can, like other washing products, cause dermatitis, particularly among those predisposed to such a condition. However, their widespread use has not in practice led to any significant growth in the incidence of dermatitis and is not likely to do so if they are used in a sensible way. The advice is given that users of synthetic detergents should avoid making up unnecessarily strong solutions, and in any event to rinse and dry the hands after the washing job is finished. People with unusually sensitive skins will no doubt choose the product best suited to

themselves and will continue to use gloves, hand creams and lotions.

The effects of ingestion are not so clear, but there seems little reason for alarm. As the report points out, few people are likely to eat or drink even a mouthful of synthetic detergent neat, or in a strong solution. Serious effects have followed ingestion of a cationic detergent in one case in America ("cationics are bactericidal, and therefore need to be handled with care"); but the report states that most synthetic detergents used in Britain are based on anionic or non-ionic surface-active agents, and the committee has no evidence that these or the "builders" usually incorporated with them would, if swallowed, have serious effects. Moreover, most household synthetic detergents are sold as powders, and accidental swallowing of any sizeable quantity would be difficult. Therefore it is not expected that any material risk of acute poisoning by ingestion will arise from continued extensive use of these products. The position of chronic poisoning is more obscure. If crockery and eating and cooking utensils are washed with synthetic detergents and drained dry without rinsing, some trace of the detergents is likely to remain on the surface and be ingested during subsequent use of the articles. The amounts thus ingested are, of course, likely to be minute, and no evidence of significant ill effects has been obtained from investigations involving ingestion of larger amounts by laboratory and domestic animals and by human subjects. Nevertheless, these investigations have been for only limited periods, and the possible occurrence of serious effects over a much longer term cannot be ignored. It is to be hoped that the possibility will be kept in mind, and perhaps long-term studies carried out.

Another aspect of the effects of synthetic detergents is in what their cleansing and foaming properties do to household appliances, to plumbing installations and to sewage systems. The possibility exists that the cleansing properties of detergents may, by removing films of grease or soap curd, either encourage corrosion of metal appliances and pipes, or expose the corrosion when it has been previously hidden. There is apparently no evidence that this has caused any serious trouble up to the present, but the report rightly suggests that the growing use of these new materials may well increase the importance of avoiding, in plumbing, both the use of easily corrodible metals and the use together of metals which are electrochemically dissimilar. Similarly, although the foaming properties of synthetic detergents have occasionally caused "backing up" of waste pipes with overflow into the dwellings on the lower floors of high blocks of flats, this is not a frequent or particularly serious occurrence; it may with advantage be borne in mind by those designing the drainage of multi-storeyed dwellings.

In cities and many rural areas virtually all the synthetic detergents (and some of the accompanying phosphates) from households and a good deal of those from industry pass into sewage treatment works. Most of them do not appear to be readily or completely destroyed or otherwise eliminated during existing processes of sewage treatment. In varying degrees, depending upon the process used at particular works, the following effects are encountered: (a) Foam occurs, or is liable to occur, to an extent that causes nuisance, and could in some cases endanger public health. (b) The purification processes seem liable to be retarded and the general quality of the effluent therefore worsened, an effect which can be offset only with costly extra treatment plant. (c) The effluent discharged contains residual surface-active material and is likely also to have a higher phosphate content than formerly. This effluent frequently goes into a river, which is in consequence affected adversely by the presence of the foam and of offensive and toxic material, and by interference with fish and plant life. When, as often happens, such a river is a source of water supply, this is impaired in two ways: first, because the sewage treatment has been impaired; second, because residual ingredients of synthetic detergents may add to the difficulties of water purification, whether or not their presence in minute quantities is harmful to those who drink the water.

¹ "Report of the Committee on Synthetic Detergents"; Ministry of Housing and Local Government. London: Her Majesty's Stationery Office: 1956. 9½" x 6", pp. 60. Price: 3s. net.

This is a very sober report, in which an effort is obviously made to keep things in perspective and to avoid possible future dangers rather than to be alarmist about the present position. It is stated quite simply that except as regards foam production at some sewage works, the risks and difficulties to which the synthetic detergents appear to be giving rise at sewage works, in rivers, and at certain waterworks, are limited and marginal, rather than widespread and acute. "But in this age of increasingly complex social and industrial development our environmental health services are functioning without any large margin of safety, and can be kept safe only by continuous action to ensure that even slight possibilities of danger are minimised, if not avoided, wherever practicable." Statutory restrictions control the industrial contribution to public sewers of materials intractable to sewage treatment; but domestic discharges form the bulk of most sewage flows, and "with the advent of household synthetic detergents of the present relatively stable type it seems that the situation is being altered for the worse". The committee find no cause at present for alarm, but advocate concerted effort to safeguard the position as soon as possible. They put forward certain constructive recommendations. First they suggest measures to keep a tab on the concentrations of surface-active materials in sewage and water supplies. They state the need for keeping under medical review the possibility of long-term effects on health being caused by the ingestion of small amounts of synthetic detergents. They suggest investigations at selected sewage works into how the practical problems may be dealt with more effectively at that stage. At the same time, they recommend that manufacturers of household synthetic detergents should investigate the feasibility of producing efficient washing products based on materials which can be readily oxidized or eliminated, and will not cause persistent foaming, during sewage treatment by present available methods. In order that the matter may not get out of hand they advocate the setting up of an advisory body to give counsel and encourage research and to keep the position under constant review. We shall watch further developments with interest, even though we may not at present be faced with a comparable problem in Australia.

NAUGHTINESS OR WHEAT FLOUR?

It has been clearly demonstrated that removal of gluten from the diet of patients with coeliac disease is followed by rapid improvement and generally cure. This condition is relatively rare, but a much commoner syndrome which reacts in the same way to absence of wheat gluten in the food has been described by G. Daynes.¹ He has called the syndrome the pre-coeliac syndrome, although he does not claim that it may go on to coeliac disease. "Typically a child between one and five years becomes naughty and difficult a few days after the onset of an acute infectious illness such as measles or gastro-enteritis. He is irritable, negativistic and spiteful, sleep is disturbed, and he wakes up many times in the night and often screams; his appetite is poor, he fails to gain weight, his abdomen is often distended and the stools become bulky, pale and offensive." The condition if left untreated usually diminishes or disappears in a month or two, but may last for twelve months or more. In the cases which last for many months *petit mal* attacks may develop. If the patients are immediately put on a gluten-free diet cure commonly takes place within a few days, but the symptoms may return if wheat products are given too soon. The condition is apparently not uncommon; the author states that he has seen 50 to 60 cases in general practice in two and a half years. He describes a somewhat similar condition seen in a few adults which he calls the headache insomnia depression (H.I.D.) syndrome. A gluten-free diet brought prompt relief of all symptoms.

The symptoms of pre-coeliac syndrome in young children are strikingly similar to those seen in canine hysteria

which occurs in dogs after the ingestion of chemically treated (anginized) flour, and fits, when they occur, are of the same nature in both conditions. The cause of the condition is obscure. It is not caused by chemically treated wheat flour, although the author claims that the severest reactions have been precipitated by stale wheat flour. He suggests that the infective agent damages body cells and makes them sensitive to certain allergens, particularly gluten, but gives no evidence for the claim. A difficulty which the author himself mentions is that wheat flour products have been eaten by man for centuries, but nobody seems to have noted this condition before unless certain cases, partially described by allergists, can be included. If the condition is really related to wheat gluten ingestion, as the author claims, much work is required to determine the causal factors. In the meantime it seems worth while to try a gluten-free diet in young children showing all or many of the symptoms described.

GOOD ADVICE FOR VISITORS TO THE UNITED KINGDOM.

MEDICAL men and women who are planning a visit to the United Kingdom should know about the Empire Medical Advisory Bureau and the services it offers. Established in 1948 by the Council of the British Medical Association, the Bureau exists to help medical practitioners coming to London from the various parts of the British Commonwealth and Empire. As well as its Committee of Management, it has an Advisory Committee of distinguished people fully representative of government departments and societies interested in the welfare of overseas visitors, as well as of the medical profession. The comprehensive nature of this Advisory Committee ensures that the Bureau can arrange ready entrée into all sorts of activities and places, and this the Medical Director, Brigadier H. A. Sandiford, and his staff are always willing to do. The bureau is particularly anxious to welcome visitors from overseas and to make them feel at home in Britain, and it can and does do a great deal to help with the difficult problem of accommodation.

Post-graduate education is, of course, one of the major interests of medical practitioners visiting the United Kingdom. The Bureau is in close touch with the British Post-Graduate Medical Federation and other organizations and authorities concerned with post-graduate instruction. It can provide detailed information for the inquirer, whether he wishes to undertake a course of study for a higher qualification or just wishes to see some of the latest work in his own field; and it can usually arrange valuable introductions.

In addition the Bureau can provide information on all manner of things that concern the visitor, who is invited to make use of the comfortable Reception Room at the Bureau. There he will find announcements of lectures and meetings, as well as operation lists; he can learn whether his friends are in London (if they have been to the Bureau); he can obtain information on what is on and how to get to places, whether he is bent on business or pleasure.

This is an admirable set up, which will be commended by all who have had first-hand experience of it. Visitors to London will be well advised to call at the Bureau, which is at British Medical Association House, Tavistock Square, London, W.C.1, and make the acquaintance of Brigadier Sandiford and his staff. One thing, however, is to be stressed. The Bureau urges all intending visitors to the United Kingdom to give it as long notice as possible, giving the following information so far as they can do so: projected date of arrival, period of stay, main and other objects of the visit, and requirements from the Bureau. When the visitor actually arrives in London, a letter of introduction from the local honorary secretary of the British Medical Association, whilst not essential, is welcomed, and this may be helpful if references are required from visitors taking furnished flats.

¹ *Proc. Roy. Soc. Med.*, July, 1956.

Abstracts from Medical Literature.

RADIOLOGY.

The X-Ray Findings in Primary Hepatoma in Infants and Children.

A. R. MARGULIS, C. M. NICE AND L. G. RIGLER (*Radiology*, June, 1956) state that primary hepatoma is of relatively rare occurrence in infants, but, in spite of its low incidence, it is one of the commonest neoplasms of the liver seen in infancy and early childhood. An analysis was made of the clinical and radiological findings in 11 cases of primary carcinoma of the liver in infants and young children. It was found that in the majority of cases the diagnosis could be made by simple X-ray studies such as upper and lower gastro-intestinal tract examinations and urographic studies, with the aid of lateral views. The most frequent and helpful clinical signs were the presence of a growing upper abdominal mass and anemia. X-ray studies will make possible localization of the mass intraperitoneally by demonstrating displacement of the anatomical landmarks. The kidney on the involved side is usually seen to be separate from the tumour; furthermore, it may be depressed and pushed back. The duodeno-jejunal juncture, which is intimately fixed to the retroperitoneal structures by the ligament of Treitz, is never pushed forward, a sign that is easily verified from a lateral film of the gastro-intestinal tract. The portions of the ascending and descending colon that are retroperitoneal can be seen posteriorly in normal position, while the transverse colon, with its long mesentery, is displaced anteriorly, frequently being wrapped around the mass. The second portion of the duodenum is also seen in its normal retroperitoneal position. The mass of a primary carcinoma of the liver is inseparable from the liver and usually presents an undulating lower border. Calcification within the mass was clearly present in three of the authors' 11 cases.

Punctate Epiphyseal Dysplasia.

L. W. PAUL (*Am. J. Roentgenol.*, January, 1956) states that punctate epiphyseal dysplasia (*chondrodysplasia calcificans congenita*) is a rare disorder characterized by the occurrence of numerous small foci of calcification in many of the cartilaginous portions of the infantile skeleton. These form during intrauterine life, subsequently decrease in size, and disappear. If there is no associated disorder of enchondral bone formation (*chondrodysplasia*), normal epiphyseal centres form and develop, and growth proceeds without interruption, leaving no skeletal defects. Dwarfism of the "short leg" type often is present. In the case reported by the author this was limited to one lower extremity together with abnormality of growth of several of the dorsal vertebrae. While the stippling and the abnormality of growth seem to be related, the stippling of itself does not appear to be the sole cause of the dwarfing. There is no evidence that

punctate epiphyseal dysplasia is a precursor of osteopikilosis, either of the spotted or of the striped variety, or that it is related in any way to the fragmented epiphyses of cretinism. In the case reported, radiological observations of the skeleton were carried out over a period of approximately nine years.

Intrapulmonary Septal Lymphatic Lines.

R. G. GRAINGER AND J. B. HEARN (*J. Fac. Radiologists*, July, 1955) have reviewed 134 patients with mitral disease who had been subjected to cardiectomy, with reference to their pulmonary artery and capillary pressures, effort disability, presence of "B lines" (of Kerley) and post-operative progress. Anatomical, pathological and theoretical evidence is presented to determine the causation of the "B lines" seen on chest radiographs. The two main groups of pathological states in which they are found are: (a) those in which patients with impaired centripetal lymph-flow in the lung (for example, hilar reticuloses, sarcoidosis, lymphangitis carcinomatosa, pneumoconiosis et cetera) have dilatation of, and stasis within, the interlobular lymphatics, with consequent impairment of absorption of tissue fluid from the interlobular septa; (b) those in which there is increased transudation of fluid from the pulmonary capillaries into the pulmonary stroma. This increased volume of fluid causes oedema of the septa and distension of their draining lymphatic vessels. The authors consider that "B lines" are caused by an increase in the radio-opacity of the septa between the peripheral pulmonary secondary lobules, usually due to oedema and lymphatic dilatation. Their visibility on the chest radiographs of patients clinically selected for mitral valvotomy is a very favourable prognostic sign.

Retroperitoneal Tumours.

J. A. EVANS AND N. POKER (*J.A.M.A.*, July 21, 1956) discuss newer radiological techniques in the diagnosis of retroperitoneal tumours. They state that special difficulties hamper the diagnosis of tumours in the space behind the posterior parietal peritoneum, above the level of the sacrum, and up to the twelfth rib and twelfth thoracic vertebra. In countering these difficulties, two of the newer radiological techniques have proved especially helpful—namely, nephrotomography and induction of retroperitoneum. The technique of nephrotomography involves the precise timing of the intravenous injection of contrast medium and the taking of tomograms at preselected levels. It has given valuable information about cysts and tumours in 195 cases in the experience of the authors. A recent improvement in retroperitoneumography involves the use of oxygen in place of air to avoid air embolism.

Pulmonary Intracavitary Fungus Ball.

E. J. LEVIN (*Radiology*, January, 1956) states that, as the designation implies, the essential feature of pulmonary intracavitary fungus ball is a ball of mycelia lying free in a pulmonary cavity which communicates with the bronchial

tree. The most characteristic complaint, and in general the presenting symptom, in cases of pulmonary fungus ball was haemoptysis. This occurred in 17 of a collected series of 27 cases. The pulmonary haemorrhages varied in severity from blood-flecked sputum to exsanguinating episodes of haemoptysis, but it was unusual for the bleeding to amount to more than a few tablespoonfuls. As a rule the bouts of haemorrhage were repeated at intervals of a few months, but in a few instances they were separated by periods of many years. A second notable feature of the disease was the excellent health enjoyed by almost all the patients. There were no reports of fever, pain, weight loss or asthenia. Cough and expectoration were frequently encountered, but rarely were they significant elements of the history. Laboratory findings were almost invariably normal. The radiological diagnosis of an intracavitary fungus ball is readily and reliably made. The fundamental feature is the presence of a rounded mass within a thin-walled cavity. To date the lesion has been found only in the upper lobes, and rarely, in the superior segment of either lower lobe. The pulmonary parenchyma surrounding the cavity may appear normal or show a decrease in volume, as evidenced by displacement of the hilus or a fissure. A few fibrotic strands or linear areas of infiltrate are generally seen in the affected segment. The thin-walled cavity is sharply demarcated from the remainder of the lung and lies in apposition to a pleural surface. It is usually circular in outline, but may show some degree of scalloping and trabeculation. A fluid level in the cavity has never been reported. Occupying from 25% to 95% of the total volume of the cavity, and freely movable within its confines, is a smooth round or ovoid mass. Calcification may be present as small nodules within the mass or as a fine rim around a portion of its periphery. Of paramount importance in the X-ray diagnosis are the mobility of the mass and the presence of a crescent of air between it and the cavity wall. These details may not be detected on routine teleroentgenograms, particularly in those cases in which the ball of fungi occupies almost the entire volume of the cavity. If, however, the tangential beam afforded by fluoroscopy with spot-film radiography is utilized in both the upright and recumbent positions, the radiolucent crescent as well as the mobile character of the mass will be clearly demonstrated. One of the more unusual features of this disease is the relative stability of the lesion. No significant change was apparent in a number of patients followed for many years, as long as seventeen years in one case.

Segmental Infarction of the Small Bowel.

B. S. WOLF AND R. H. MARSHAK (*Radiology*, May, 1956) describe the radiological findings in a group of cases of small bowel infarction, which did not go on to complete recovery, but rather to segmental stenosis and intestinal obstruction. The term "segmental" is used because the area of stenosis is relatively small, measuring three to six inches in length. An infarcted loop of

small bowel may not be so completely devitalized as to lead to gangrene and perforation. The different layers of the bowel wall are not equally sensitive to interference with their blood supply. The mucosa appears to be most dependent on an intact blood supply, since mucosal ulceration occurs first. The muscular fibres are next involved, but the connective tissue elements, both submucosal and subserosal, may maintain their viability for a considerable period. It is, therefore, possible to speak of incomplete or partial infarction of a loop of small bowel, in which all the layers do not undergo complete devitalization. This, of course, is dependent on the maintenance of some circulation, presumably through anastomoses, and also to a marked degree on the ability to control infection of the compromised bowel by intestinal organisms. Revascularization of a partially infarcted loop may follow the administration of antibiotics. Restoration to a completely normal state will not occur, however, if there have been extensive mucosal destruction and persistent limitation of the vascular supply. Instead, inflammatory granulation tissue forms, with subsequent fibrotic changes causing a stricture. As in an ordinary mechanical obstruction, dilatation of the bowel proximal to the stricture occurs, terminating abruptly in a narrowed, firm tubular structure two to five inches in length and one-half to one-quarter the diameter of the normal bowel.

Pulmonary Hypertension in Congenital Heart Disease.

T. E. KEATS, V. A. KREIS AND E. SIMPSON (*Radiology*, May, 1956) reviewed 36 cases of proved pulmonary hypertension associated with interatrial septal defects, interventricular septal defects, or patent ductus arteriosus, in an attempt to determine whether the criteria established for the radiological detection of pulmonary hypertension in mitral valvular disease could be applied also in congenital heart disease. The only one of these criteria which proved applicable was the disproportionate narrowing of the peripheral pulmonary arteries as compared to the proximal arteries. This sign was present in 64% of the series studied. The other reported signs of right ventricular and pulmonary outflow tract enlargement occur in the presence of left-to-right shunts without pulmonary hypertension and are, therefore, unreliable as indicators of the presence of pulmonary hypertension. The degree of enlargement of the heart, the right ventricle and the pulmonary artery appears to correlate more closely with the magnitude of pulmonary blood flow.

Timed Disintegration Capsules.

T. M. FEINELATT AND E. A. FERGUSON (*New England J. Med.*, May 17, 1956) have made an in-vivo roentgenographic study of timed disintegration capsules. Contrary to the common impression, the contents were found to be scattered widely throughout the length of the gastro-intestinal tract before the individual particles dispersed or dissolved. The popular belief that the mass of the capsule contents remains in a single blob, based on an artist's conception, was shown to be erroneous. In the present

study, four different kinds of "Nyscaps" (Nysco timed disintegration capsules) were used, containing radiologically opaque barium sulphate (five milligrammes). The first type was for immediate disintegration, the second for timed disintegration in about two hours, the third in about four hours, and the fourth in about six hours. Roentgenograms were taken immediately after ingestion and were repeated in two, four, six, eight and ten hours. The roentgenographic technique demonstrated a longer disintegration time than the modified United States Pharmacopoeia method. The disintegration time was two to four hours, as compared with two hours by United States Pharmacopoeia technique, four to six hours, as compared with four hours, and six to ten hours, as compared with six hours. It is believed that the roentgenographic technique affords a more accurate study because it is an in-vivo method. The great convenience of the timed disintegration capsule makes it an ideal method for the administration of drugs usually given in three divided doses.

RADIOTHERAPY.

Malignant Disease of the Ovary and Radiotherapy.

F. ELLIS (*J. Fac. Radiologists*, July, 1956) reviews the cases referred to the Radiotherapy Department in Sheffield during the author's term of office there from 1930 until 1943. These were 168 cases of malignant disease. The author states that it must be realized that during that term methods were being developed and experience was being gained. A follow-up of at least ten years has been possible in most cases. The most usual classifications are made according to the degree of spread of the disease and according to the histological type of tumour. The cases were grouped into six stages: (i) one ovary alone affected, (ii) two ovaries affected, (iii) extension beyond the ovary but growth completely removable, (iv) growth only partially removable locally, (v) no removal possible owing to spread in abdomen, (vi) local recurrence after complete operation. The survival figures according to the stage of the disease are given as follows: (i) 49%, (ii) 60%, (iii) 20%, (iv) 24%, (v) 5%, (vi) 14%. Of cases not staged in 42% the patient was alive at five years. In other words, a total of 46 out of 168 patients are alive and well, giving a total five-year survival of 27%. The author gives the surgical procedures carried out and the survival rate, and indicates in the case of the operated patients the number of survivals relative to the removal or leaving of the uterus and to the occurrence or not of rupture of the tumour. He points out that a complete operation gives manifestly better results than an incomplete one. In view of the fact that the uterus may be removed in a more advanced case so as to make the operation complete, no justifiable conclusions can be drawn regarding the desirability of hysterectomy except that leaving the uterus does not seem to make the results worse. The author has tried to persuade gynaecologists to leave the uterus *in situ* if its removal did not make complete an otherwise incomplete

removal. The object of this was to use the uterus as an applicator for radium to treat the pelvis from inside. He quotes the view of Kottmeier that intrauterine radium treatment is the best method of preventing recurrence in the pelvis. The author's radiation treatment consisted of treating the lower part of the abdomen up to the umbilicus—a dose of radiation of 3000r in a month. Also, when the uterus was left radium was used in the canal and vault with a modified Stockholm dose—one application of 50 milligrammes in the uterus and 75 milligrammes in the vagina for twenty-two hours. If the uterus had been removed, radium was applied to the vaginal vault. The author shows tables to indicate that results were improved if the uterus was used for applying radium. In cases of incomplete removal and complete radiation treatment, the author has shown that if the uterus was not removed, 32% of patients survived five years and 21% ten years. If the uterus was removed, then there were no five-year survivals. The author believes that intracavitary administration of radiation should be used in all cases of these malignant tumours except dysgerminoma, which is sensitive to small doses of radiation. This treatment is combined with X-ray therapy to the lower part of the abdomen. In all, out of 168 patients he achieved a ten-year survival rate of 23% with surgery and this form of radiotherapy.

Subacute Thyroiditis.

L. TAYLOR (*Ann. Int. Med.*, June, 1956) discusses the relative merits of X-ray therapy and cortisone in the treatment of subacute thyroiditis and reports four cases. Two patients with subacute thyroiditis were treated with cortisone. In the milder case the signs and symptoms were rapidly suppressed and did not recur. In the more severe case the disease ran its course in spite of suppression by cortisone, and dangerous side effects of cortisone appeared. In one moderately severe case of thyroiditis the condition was only partially suppressed by cortisone in a dose which produced unpleasant side effects. Subsequent X-ray therapy apparently cured the disease in a period of sixteen days. In one severe case of subacute thyroiditis with labile diabetes mellitus the thyroiditis was apparently cured with X-ray therapy alone in a period of sixteen days. The author states that cortisone produces immediate relief of the signs and symptoms of subacute thyroiditis, but merely suppresses the manifestations of disease. In severe cases the side effects and dangers of long-term therapy may outweigh the clinical benefit obtained. Since X-ray therapy continues to have a curative effect in a high proportion of cases without side effects or relapses, it should be considered superior to cortisone alone. In severe cases combined therapy with cortisone and X rays is worthy of further trial. Cortisone should be used for its immediate effect if no contraindications exist, X-ray therapy being started simultaneously. In the cases reported in the literature in which cortisone therapy has been used, in spite of a majority of favourable reports, the author has noted that the follow-up periods have often been short, and numerous recurrences have been seen.

On The Periphery.

"QUEEN SQUARE"

A MAN with a strong right arm, standing in the middle of Queen Square and unobstructed by those magnificent plane trees, might throw a stone onto any of four hospitals. Two have their entrances actually in the Square, and one, the National Hospital for Nervous Diseases, by the sheer brilliance of its work, has captured the name of the Square and assumed it as its own. So close are our bonds with Britain, that I suppose there is scarcely a neurologist practising in Australia who was not nurtured or polished in his specialty at "Queen Square". The stature of neurology at "Queen Square" is so grand, that those who have trained there might be pardoned for regarding its practice as an esoteric art. They might ask (but do not): "Can any doctor who has not walked these wards fully understand what neurology can be?"



FIGURE I.

"Queen Square", The National Hospital for Nervous Diseases.

One is not likely to forget the morning out-patient sessions, with tiers of eager post-graduates poised over the demonstration couch. A variety of techniques in teaching is offered. On one day, neurology is dispensed with elegant sentences, and the history and signs will be dissected dispassionately, in the best court-room tradition. On other days, audience participation is the method employed, with every doctor feeling that the patient lying on the couch below is his own personal problem and responsibility. Wit and quips there are, to focus attention and to point a moral; but it is a wit tempered by deep knowledge and a wealth of human understanding. Whatever the technique employed, whether it is the orderly marshalling of facts or the biased approach of suspecting a diagnosis and then discarding routine in an inspired hunt for confirmation, the final phase is the same on every morning. There is the disciplined recapitulation of symptoms and signs, with momentary pauses for lightning calculations, then the advancement of hypotheses and conclusions and the final summing up. How much finer than this can medicine be?

How many Australians, among three hundred doctors jamming the theatre, have sat in the serried rows and stared down at the special Saturday morning demonstrations? One can hear a pin drop as the relentless unfolding proceeds below, leading up, with perfect aplomb, to the differential diagnosis or the *dénouement*. A glance round the audience and a count of the nationalities drawn to "Queen Square" reveals the triumph of British neurology.

Saturday morning is still rather a gala affair. From ten o'clock onwards the stream of visitors converges from the tube at Russell Square, winding its way through the hammering traffic of Guilford Street and the haze of diesel fumes, past the brittle clamour of the hurdy-gurdy. On Saturdays, the hurdy-gurdy dominates the Square, contesting the air with the grumbling engines, jangling between the tall buildings, shrilling into inspired tremolos, wound with steady fervour by the man with the row of medals and the paralysed face. At the last minute, with an outward show of nonchalant familiarity, comes the contingent from London House, a block away.

Old habitués will be glad to learn that the remainder of the Square is little changed. Queen Charlotte's statue still gazes the length of the lawns (although the Square was named for Queen Anne) to the *Ospedale Italiano* at the far end. However, when Queen Square is mentioned, many Australian doctors who care nothing for neurology will think first of that five-storied horror of inquisition, the Examination Hall of the Royal Colleges of Physicians and Surgeons. How many stomachs have tightened at its portal? The Hall's front door faces the Square, censorious and aloof; one senses that distinctions carved in other lands will count for naught within. Candidates cannot aspire to the front door; they enter via a side lane leading to a sunless, rear basement. How much meaner than this can an entry be? For a viva-voce examination, there is a five-storey climb. As someone remarked: "One must be fit to pass the M.R.C.P."

The Royal London Homœopathic Hospital still shuffles for room against the Hospital for Sick Children, round the corner in Great Ormond Street. Facing this hint of modernism, the Church of Saint George the Martyr seems to be visibly shrinking on its side of the Square. Yet the church's roots are firm. Described only fifty years after its foundation as "a perfectly plain and most inelegant brick building", it has triumphed over periods of neglect and apathy and it has survived war. Condemned as unsafe on account of bomb damage, the church was lately revived, helped by donations from other churches of the Commonwealth and America dedicated to Saint George. Repairs and restorations were completed in time for the church to celebrate its two hundred and fiftieth anniversary this year.

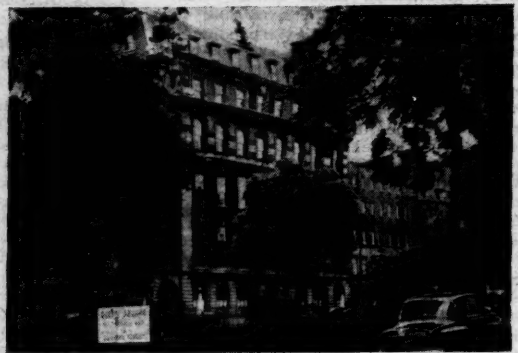


FIGURE II.

The examination hall of the Royal Colleges of Physicians and Surgeons.

A few old houses still cluster at one end of the Square, wedged in beside the Royal Institute of Public Health and Hygiene and the Imperial Turkish Baths Ladies' Entrance. One of these houses wears the flag of a Fighter Control Unit of the Royal Auxiliary Air Force. Near by, set in the lawn of the Square, is a reminder of a beginners' air war. It is a plaque of stones which marks the spot where a Zeppelin bomb fell and exploded on the night of September 8, 1915, and "although nearly one thousand people slept in the surrounding buildings, no person was injured".

The dress of the professional class in London is not what it was. I remember, as a pre-war student, how my junior teachers would return to Melbourne afire with enthusiasm, with new dictions, and natty spats. There are no spats now, and excitement on the roads takes other forms. London is the very home of jay-walkers. Their faith in the skill and kindness of motorists belongs to a past age, when motoring was fun and gallantry at the wheel second nature. Active young men and old ladies alike will teeter on the edge of the footpath, whilst a green light beckons them on to safety. As soon as the light turns red, they project themselves into the accelerating press of traffic with a devilish inner glee.

These differences in the English way of life are soon assimilated by the visitor, and if one's progress towards Queen Square each morning is harassed by the irruptions of pedestrians before one's very wheels, it is all done with great good nature. It is recorded that at the turn of the seventeenth century, when Queen Square was fashionable and Mr. Lamb's conduit conveyed a supply of pure, health-

ful water to the residents of Snow Hill, a mile away. Queen Anne's ailing son, the little Duke of Gloucester, was boarded in the precincts to be strengthened by the vigorous air. Queen Square is not fashionable now, in the social sense. Medically, I suppose it has never been in greater heart. Many Australians will pause a moment now, to think with gratitude of old times and old teachers and a fine people at Home.

F. R. T. STEVENS,
Launceston.

Out of the Past.

In this column will be published from time to time extracts, taken from medical journals, newspapers, official and historical records, diaries and so on, dealing with events connected with the early medical history of Australia.

TREATISE ON THE DISEASES AND MEDICAL TREATMENT OF CHILDREN AND FEMALES IN NEW SOUTH WALES BY C. SMITH, M.D.¹

[From the *Sydney Times*, January 21, 1837.]

The great mortality among the children in the colony of New South Wales has induced the author during nearly 8 years of practice to enquire the causes and if possible to apply such remedies as the diversified forms of the diseases required: how far his mode of treatment has been successful others must testify.

The diseases of Females will embrace the period from ten years of age to fifty, varied from European by Climatic Habit and Endemic Diseases.

The object of the author is neither emolument nor professional honour but to enable every mother of common sense to apply such remedies (in the absence of professional aid) as may save the life of her child and her heart the pangs of maternal sorrow by its premature death.

The price will not exceed five shillings and every subscriber will be expected to pay the printer on delivery of the work. Persons who wish for the publication will send their names and addresses post paid to Dr. Smith, Pitt St., Sydney, and as soon as 1000 copies are engaged the work will go to the press.

Pitt Street January 16, 1837.

Correspondence.

SURGERY AND THE AUSTRALIAN GENERAL PRACTITIONERS.

SIR: According to *The Sun-Herald* of October 14, Professor Andrew Claye, the visiting Sims-Black Travelling Professor, considered "too much surgery was being done by Australian general practitioners". This is a serious statement on the part of an authority of Professor Claye's standing and present appointment. The alleged statement, it is hoped, is based on full knowledge and a proper investigation. Even so one must disagree with the conclusion reached.

The amount of surgery performed by general practitioners in this country is not known to me, but I do know that a considerable proportion of emergency surgery must be done by a general practitioner, or otherwise the patient must die.

Professor Claye will already be aware that Australia is a country of great distances with many small communities, which are normally more or less isolated, and in bad weather and floods this isolation may be absolute. A surgical emergency, for example, a ruptured ectopic gestation, must be dealt with on the spot by the local general practitioner. It is only in the cities and some larger centres that specialist surgeons are available.

The Australian general practitioner has become a surgeon of necessity. Not a few hold the diplomas of the specialist Colleges, and most have had training in emergency surgery. When Professor Claye has enjoyed the hospitality of this

country a little longer, he may be in a position to assure himself and the lay Press that the Australian general practitioner is well trained and renders an effective service to the community. Perhaps he may be able to agree with another Sims-Black Travelling Professor (Professor Dunlop, of Edinburgh), that the general practitioners of Australia and New Zealand are the best in the world.

Yours, etc.,
W. A. CONOLLY,

Chairman, Australian Council, The College of General Practitioners.

Sydney,
October 19, 1956.

DRUGS AND IMPORT RESTRICTIONS.

SIR: In common with many practitioners, one is experiencing difficulty in having prescriptions for certain drugs and orders for equipment supplied, owing to import restrictions.

To detail a few: Prescriptions for "Ansolsen" have not been able to be supplied by the local chemist, and this, where it concerns, as it does, severe hypertensives stabilized on the drug, presents a source of difficulty in their management, and danger for them.

"Sulphatriad" tablets have recently joined the list of drugs not available; and although one has other alternatives, it is disconcerting that the short supply is due to purely administrative reasons, and that it should be allowed to continue.

Boots's representative informed some weeks ago that ample supplies of their preparation of benactyzine hydrochloride ("Nutinal") are on the wharf, but they could give no time of their release.

Supplies of Bayer Pharma's very excellent blood collecting "Venule" have been unavailable for the same reason for the last three months. I have found this last shortage a particular inconvenience, as my country practice includes four widely separated areas, which I visit, and it is difficult to achieve aseptis for venipuncture, with the ordinary needle and syringe technique, under such conditions. The most common use for these "Venules" is the routine collecting of blood for blood-grouping in pregnancies, and their particular merit has been proved to me over the years, as with this method I never have the result returned "blood unsuitable for grouping owing to haemolysis"; but very frequently this result is returned when the ordinary needle and syringe technique is used. No doubt this is due to the impossibility of keeping equipment and blood samples completely sterile and dry when one is travelling round dusty country roads.

I do not know whether it is inefficient proportioning on the part of the drug houses, or whether the fault lies elsewhere, but I feel that the matter should be investigated, and some action taken by us as a body to see that it does not persist.

Yours, etc.,

Emmaville,
New South Wales,
October 20, 1956.

RICHARD PATERSON.

POLY-VINYL-PYRROLIDONE.

SIR: In a paper entitled "The Effect of Poly-Vinyl-Pyrrolidone and Tetra-Hydro-Aminoacridine on the Mortality and Survival Time of Mice Injected with Snake Venom" (M. J. AUSTRALIA, 1956, 2: 8), evidence was presented of the value of both of these compounds (PVP and THA) as therapeutic agents. The above paper was submitted for publication on November 22, 1955, and in April, 1956, an abstract published in "Proceedings of the American Association for Cancer Research", Volume 2, page 120, on work by Hueper, reported "Poly-vinyl Pyrrolidone a Cancerogenic Substance in Rats". As soon as I was aware of this report in August, I wrote to the manufacturers of PVP concerning this, and the opinion of the German group concerned was forwarded to me. In the above reported research, pure substance (molecular weight 20,000 to 300,000) was injected subcutaneously or intraperitoneally, or injected intravenously as a 7% solution eight times. In a special rat strain (Bethesda Black) neoplastic reactions were reported after eighteen months in the lymphoid and reticulo-endothelial tissues, though no report was then given on their transplantability. In trials on mice and rabbits, no tumours

¹From the original in the Mitchell Library, Sydney.

were observed. It has been reported that PVP has been administered to millions of human patients during the past fifteen years. So far no suspicion has been attached here that PVP might cause tumours in man. Reexamination of patients who received PVP six years ago and more is now being carried out, and will be reported on when this information is to hand. It is pointed out that mesenchymal tissue of the rat is very prone to tumour growth. An English group concerned with marketing PVP in solution reported similarly.

It is to be noted that the above effect has been observed only in a special strain of rats and not in other animals, while no suspicion attaches to human subjects. In my opinion PVP could be used at this stage in subjects who might be expected to die from their illness where such a condition is known to respond to PVP.

As regards Australian tiger snake venom, experiments concerning which are now under way, neither PVP as molecular weight 12,000, nor as 30,000, is of value in mice as therapeutic agents; but repeat trials on cobra venom with PVP molecular weight 12,000 (previously 30,000 molecular weight PVP was used) confirm the value of this agent in such poisoning.

Yours, etc.,

Department of Physiology,
University of Melbourne,
Melbourne.
October 12, 1956.

E. R. TRETHEWIE.

MEDICAL ATTENDANCE ON DOCTORS AND THEIR FAMILIES.

SIR: The medical treatment of doctors and their families has always been accepted by the medical profession as an act of courtesy which we medical practitioners enjoy being able to do gratis. However, several doctors' wives and members of medical families have expressed the opinion that doctors should, when requested, render a medical account. They prefer this to the present custom, according to which in order to express their gratitude they have to try to choose some suitable gift to send to their medical adviser. This has nothing to do with the finance involved—it is concerned with the sense of independence of the patient and is even more important when a subsequent appointment is being arranged.

Yours, etc.,

Hurstville,
New South Wales,
October 29, 1956.

B. L. HARRISON.

FATE OF FLUORIDE.

SIR: In their recent letter, A. B. P. Amies and P. Pincus (M. J. AUSTRALIA, October 20, 1956) claim that there have been inadequate studies of the effects of artificial fluoridation, the metabolism of fluoride and its physiological effects, and "that a wrong impression is liable to be gained not so much by what has been written as by what has been omitted" in "The Fate of Fluoride" (M. J. AUSTRALIA, September 8, 1956). However, there is a sound body of scientific evidence to substantiate the claims for the safety and efficacy of fluoridation of domestic water supplies.

1. The chemical form of fluoride in water at low concentrations (1.0 part per million) is the fluoride ion. This is shown by the fact that the colorimetric determination of the fluoride concentration in water by the zirconium-alizarin method gives precisely the same values as the determination of the fluoride in an identical sample by perchloric acid distillation (Willard, H. H., and Winter, O. B., *Ind. Eng. Chem. Anal. Ed.*, 5: 7, 1933) which gives the total fluoride content, and therefore the total fluoride is present as fluoride ion at this concentration.

2. The presence of fluoride in food is well known. McClure (*Pub. Health Rep.*, 64: 1061, 1949) refers to more than 130 foods which contain fluoride. Sea foods and tea are exceptions to the generally low fluoride content of food, but the amounts of fluoride gained from these sources is not great. Tea contains on the average 0.12 milligramme of fluoride per cup (assuming a fluoride content of dry tea of 100 parts per million), and it would require 10 cups per day to give an intake of fluoride equal to that in one quart of water containing one part per million of fluoride. The fluoride contributed to the diet by fish based on the figures for fish

consumed in England (Widdowson, E. M., Medical Research Council Report, Special Series, No. 257, 1947), assuming a fluoride content of 15 parts per million in the fish consumed, is only 0.1 milligramme per day.

3. The two mechanisms in the body which reduce the fluoride ion concentration are (i) the excretion in the urine and (ii) the deposition in the skeleton. Amies and Pincus state that "it is the amount retained in human bones that matters, not the amount excreted". Fluoride retained in the skeletal system of the persons at Bartlett in Texas, where the fluoride content of the water was 8.0 parts per million, caused no radiological changes or physiological effects of "clinical significance" in the thorough medical and dental survey made over a ten-year period by Leone *et alii* (*Public Health, Rep.*, 69: 925, October, 1954). The report of Agate *et alii* (Medical Research Council Report No. 22, "Industrial Fluorosis", 1949) gives further evidence of the lack of clinical effects of fluoride retention. Of 242 factory workers exposed to high fluoride concentrations, 32.5% showed bone abnormalities demonstrated radiologically; but "none of the workers was found to suffer clinical disability", although a number had been exposed to fluoride in high concentrations for over fifty years.

4. The quotation from the letter of Kemp and Wilson in the *British Medical Journal* of May 12 is taken out of context from a description of a severe case of skeletal fluorosis occurring in a village in West Pakistan. In this "poverty stricken" village where malnutrition is prevalent, the fluoride content of the water is 7.4 parts per million. However, there is no justification for attempting to compare the effects of water containing over seven parts per million of fluoride in a poverty stricken community suffering from malnutrition, to the effects of one part per million in communities where malnutrition does not exist. The lack of evidence of any harmful effects of low fluoridation (one part per million of fluoride) has been affirmed by the British Ministry of Health (Health Note No. 9, July, 1955): "There is no evidence that the consumption of water fluoridated to a low level of about one part per million has any harmful effects. We are fortunate in having available not only the experience of some ten years of fluoridation in America, but also that of the life long consumption of waters containing fluoride naturally both in America and in this country."

Yours, etc.,

NOEL D. MARTIN,

Associate Professor, Preventive
Dentistry.

United Dental Hospital,
2 Chalmers Street,
Sydney.
November 12, 1956.

Post-Graduate Work.

THE MELBOURNE MEDICAL POST-GRADUATE COMMITTEE.

COURSES TO BE CONDUCTED IN 1957.

THE following schedule has been drawn up as a guide for those who may be planning post-graduate study in Melbourne in 1957.

Courses for Higher Qualifications.

Part I.

Courses suitable for candidates for Part I of the M.D., M.S., D.G.O., D.O., D.L.O., D.P.M., D.D.R., D.T.R. and D.A., the Primary F.R.A.C.S., the Primary F.F.A.R.C.S. and Part I of the Diploma of the College of Radiologists, will be held in the following subjects:

Anatomy. The course commences on February 25, and will be conducted on Monday and Wednesday afternoons for four or five months.

Physiology. Arrangements will be announced later.

Pathology. The course commences on March 4, and will be conducted on Monday and Wednesday afternoons for four months.

Physics. The course commences on March 7, and will be conducted on Thursday afternoons for eighteen weeks.

Microbiology. The course commences on April 15, and will be conducted on Tuesday afternoons for fifteen weeks.

Psychology I. The course commences in late March, and will continue part time till late October.

Part II.

The following courses are for Part II candidates:

A course in medicine suitable for candidates for senior medical qualifications, such as M.D. or M.R.A.C.P., commences on June 3 and continues full time for eight weeks at the Alfred Hospital.

A course in surgery suitable for candidates for senior surgical qualifications, such as M.S. or F.R.A.C.S., commences on March 4 and continues every afternoon for eight weeks at Saint Vincent's Hospital.

A basic course in microbiology for the diplomas commences on April 15 and continues on Tuesday afternoons for fifteen weeks. A course in basic pathology commences on March 4 and continues on Monday and Wednesday afternoons for four months.

A course in radiodiagnosis for the D.D.R. and Part II of the D.C.R.A. will commence in May and continue part time for ten weeks, and a course in special pathology for the same diplomas will commence in June and continue part time for six weeks.

Courses in radiotherapy and physics for the D.T.R. and Part II of the D.C.R.A. will be arranged when candidates present.

A course in psychiatry for the D.P.M. will commence in early June and continue part time for three months. For the same diploma a few lectures in neuropathology will be arranged in September, and a course in psychopathology runs from March for eight months, part time.

A course in laryngology and otology and special pathology for the D.L.O. will commence in early May and continue part time for three or four months.

Ophthalmology and special pathology courses for the D.O. will commence on April 8 and continue part time for four or five months.

Gynaecology and obstetrics and special pathology courses for the D.G.O. will be arranged when sufficient candidates present themselves.

A two weeks' intensive afternoon course in the theory and practice of anaesthetics for the D.A. and F.F.A.R.A.C.S. will be held in November.

Refresher Courses.

A gynaecology and obstetrics refresher course for recent graduates will be conducted at the Royal Women's Hospital, full time, for two weeks from February 11 to 23. Limited accommodation will be available at the hospital for overnight residence.

A gynaecology and obstetrics refresher course for general practitioners will be conducted at the Royal Women's Hospital, full time, for two weeks, commencing on August 5. Accommodation can be provided as outlined for the course above.

A medical and surgical refresher course for general practitioners will be conducted at metropolitan hospitals, full time, for one week commencing on August 19.

A psychiatry course will be conducted by the Mental Hygiene Authority, part time, for three months, commencing in March or April.

Attention is drawn to the scientific sessions of the Jubilee of the Paediatric Society of Victoria to be held at the Royal Children's Hospital from March 11 to 15.

Conduct of Courses.

Courses in medicine and surgery as set out above will be conducted by the honorary staffs of the Alfred and Saint Vincent's Hospitals respectively. The Ophthalmological Society will conduct the ophthalmology and special pathology course, the Victorian Division of the Australian Otolaryngological Society the course for the D.L.O. Part II. The Australian Association of Psychiatrists will conduct the course in psychiatry for the diploma and the University of Melbourne the courses in psychology and psychopathology. The Mental Hygiene Authority will conduct the psychiatry refresher course and the Faculty of Anaesthetists the course in theory and practice of anaesthetics. All others shown will be conducted by the Melbourne Medical Post-Graduate Committee.

Enrolments and Inquiries.

Enrolments for all courses should be made through the Melbourne Medical Post-Graduate Committee, except for

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED NOVEMBER, 3 1956.¹

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.	Australian Capital Territory.	Australia. ²
Acute Rheumatism ..	1	2(1)	4(1)	..	..	..	..	..	7
Amoebiasis ..	..	..	..	..	..	..	..	..	..
Ancylostomiasis ..	..	..	14	..	..	..	..	..	14
Anthrax ..	..	..	..	..	..	..	..	..	..
Bilharziasis ..	..	..	..	..	..	..	..	..	..
Brucellosis ..	..	..	..	..	..	..	..	..	..
Cholera ..	..	..	..	..	..	..	..	..	..
Chorea (St. Vitus) ..	..	..	..	..	..	..	..	..	..
Dengue ..	..	..	..	..	..	..	..	..	..
Diarrhoea (Infantile) ..	4(1)	7(6)	5	..	..	..	..	..	16
Diphtheria ..	1(1)	..	..	..	3(2)	..	..	..	4
Dysentery (Bacillary) ..	..	4(4)	1(1)	2(1)	2	..	..	..	9
Encephalitis ..	1	..	..	..	..	..	..	..	1
Etiarthritis ..	..	..	..	..	..	..	..	..	..
Homologous Serum Jaundice	..	..	..	..	..	..	..	..	..
Hydatid ..	..	..	..	..	..	1	..	..	1
Infective Hepatitis ..	86(22)	38(17)	..	14(4)	2(2)	9	..	1	150
Lead Poisoning ..	..	..	..	..	..	..	..	..	..
Leprosy ..	..	..	..	..	..	..	..	..	..
Leptospirosis ..	..	..	..	..	..	..	..	..	..
Malaria ..	..	..	1(1)	..	..	..	..	..	1
Meningococcal Infection	..	5(4)	..	..	..	..	..	..	5
Ophthalmia ..	..	..	..	..	..	..	..	..	..
Ornithosis ..	..	..	..	..	..	..	..	..	..
Paratyphoid ..	..	..	..	..	..	..	..	..	..
Plague ..	..	..	..	..	..	..	..	..	..
Poliomyelitis ..	..	1(1)	1	3(2)	..	..	..	..	5
Puerperal Fever ..	1(1)	..	2(1)	..	..	..	..	..	3
Rubella ..	..	66(29)	2(2)	33(9)	3	..	..	..	104
Salmonella Infection	..	..	..	1(1)	..	..	..	..	1
Scarlet Fever ..	9(6)	12(6)	8	7(4)	1(1)	..	..	..	37
Smallpox ..	..	..	..	..	..	..	..	..	..
Tetanus ..	..	..	1	..	1	..	..	..	1
Trachoma ..	..	..	..	..	1	..	..	..	1
Trichinosis ..	..	..	..	..	..	..	..	..	..
Tuberculosis ..	30(18)	7(5)	13(9)	5(3)	12(7)	8(2)	..	..	75
Typhoid Fever ..	1(1)	..	..	..	..	..	..	..	1
Typhus (Flea, Mite- and Tick-borne) ..	..	..	..	..	..	..	..	..	..
Typhus (Louse-borne) ..	..	..	..	..	..	..	..	..	..
Yellow Fever ..	..	..	..	..	..	..	..	..	..

¹ Figures in parentheses are those for the metropolitan area.

² Figures not available.

³ Figures incomplete owing to absence of returns from Northern Territory.

the courses in psychology I and psychopathology, the psychiatry refresher course and the course in anaesthetics, for which they are made with the body conducting each, as outlined above. The Director of the Post-Graduate Committee will be pleased to answer queries concerning the 1957 programme. Correspondence should be addressed to him at the Post-Graduate Committee's office, 294 Albert Street, East Melbourne.

Inquiries concerning the Jubilee of the Paediatric Society of Victoria should be addressed to Dr. Howard Williams at the Royal Children's Hospital, Melbourne.

Royal Australasian College of Surgeons.

OPEN MEETING.

A MEETING of the Royal Australasian College of Surgeons will be held at 8 p.m. on Wednesday, November 23, 1956, at Saint Vincent's Hospital, Darlinghurst, Sydney. A series of cases will be shown. This meeting will be open to all medical practitioners.

Notice.

ENGLISH-SPEAKING UNION SCHOLARSHIP.

THE Victorian Branch of the English-Speaking Union offers a number of travelling scholarships to assist professional men and women to gain experience overseas. In 1957 two scholarships are available, and they will take the form of travel grants to the value of £A150 each, to enable professional men and women to visit the United States of America. It is hoped that these scholarships will attract those young men and women who wish to see something of their profession at work in the United States and are anxious to study various aspects of American life, and who are already contemplating such a visit and need additional financial assistance. In the United States, through the active interest and cooperation of the Hospitality Department of the English-Speaking Union of the United States of America and the respective branches of the English-Speaking Union, hospitality in the homes of English-Speaking Union members, for a period of up to six weeks, may be offered to successful candidates who are able to avail themselves of it. These branches hope to arrange a programme of hospitality, sight-seeing and personal and professional contacts. Such hospitality will be of inestimable value, especially as it will be planned in line with professional interests and other interests the scholarship holders may have outside their professions.

The scholarship will be open to professional men and women who are British subjects resident in Victoria, Australia, and who are between the ages of twenty-five and forty years. It is not intended to confine the award of such scholarships to English-Speaking Union members. In selecting candidates, the Victorian Branch of the English-Speaking Union will give special attention to the need for choosing those who, in addition to being suitable representatives of their professions, are likely to be good ambassadors for Australia in the United States, and who will prove to be pleasant guests. They may be offered the opportunity to do some public speaking overseas and, on their return, in Australia. Successful candidates will receive a travel grant of £A150 in addition to six weeks' hospitality, but will be expected to pay the remaining travelling and incidental expenses. Further inquiries may be made from the Secretary of the English-Speaking Union, 146W Toorak Road West, South Yarra, S.E.1, Victoria.

Congresses.

INTERNATIONAL CONGRESS FOR SOCIAL MEDICINE.

THE second International Congress for Social Medicine will be held in Vienna from May 31 to June 2, 1957. The theme of the congress will be "University and Public Health: The

Place and Task of the University". Further information may be obtained from Professor Dr. T. Antoine, Spitalgasse 23, Vienna 9, Austria.

Deaths.

THE following deaths have been announced:

WOODLAND.—Leslie James Woodland, on November 10, 1956, at Sydney.

POCKLEY.—Eric Osbaldiston Pockley, on November 11, 1956, at Sydney.

DECK.—Maurice Felld Deck, on November 12, 1956, at Sydney.

Diary for the Month.

Nov. 27.—New South Wales Branch, B.M.A.: Ethics Committee.

Nov. 28.—Victorian Branch, B.M.A.: Branch Council.

Nov. 29.—New South Wales Branch, B.M.A.: Branch Meeting.

Dec. 4.—New South Wales Branch, B.M.A.: Organization and Science Committee.

Dec. 5.—Victorian Branch, B.M.A.: Branch Meeting.

Dec. 5.—Victorian Branch, B.M.A.: Branch Council.

Dec. 5.—Western Australian Branch, B.M.A.: Branch Council.

Dec. 11.—New South Wales Branch, B.M.A.: Executive and Finance Committee.

Dec. 12.—Victorian Branch, B.M.A.: Branch Council.

Dec. 12.—New South Wales Branch, B.M.A.: Clinical Meeting.

Dec. 13.—New South Wales Branch, B.M.A.: Branch Meeting.

Dec. 14.—Tasmanian Branch, B.M.A.: Branch Council.

Dec. 18.—New South Wales Branch, B.M.A.: Ethics Committee.

Dec. 18.—New South Wales Branch, B.M.A.: Medical Politics Committee.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney): All contract practice appointments in New South Wales.

Queensland Branch (Honorary Secretary, B.M.A. House, 225 Wickham Terrace, Brisbane, B17): Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 80 Brougham Place, North Adelaide): All contract practice appointments in South Australia.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to the Editor, THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2651-2-3.)

Members and subscribers are requested to notify the Manager, THE MEDICAL JOURNAL OF AUSTRALIA, Seamer Street, Glebe, New South Wales, without delay, of any irregularity in the delivery of this journal. The management cannot accept any responsibility or recognize any claim arising out of non-receipt of journals unless such notification is received within one month.

SUBSCRIPTION RATES.—Medical students and others not receiving THE MEDICAL JOURNAL OF AUSTRALIA in virtue of membership of the Branches of the British Medical Association in the Commonwealth can become subscribers to the journal by applying to the Manager or through the usual agents and booksellers. Subscriptions can commence at the beginning of any quarter and are renewable on December 31. The rate is £5 per annum within Australia and the British Commonwealth of Nations, and £6 per annum within America and foreign countries, payable in advance.